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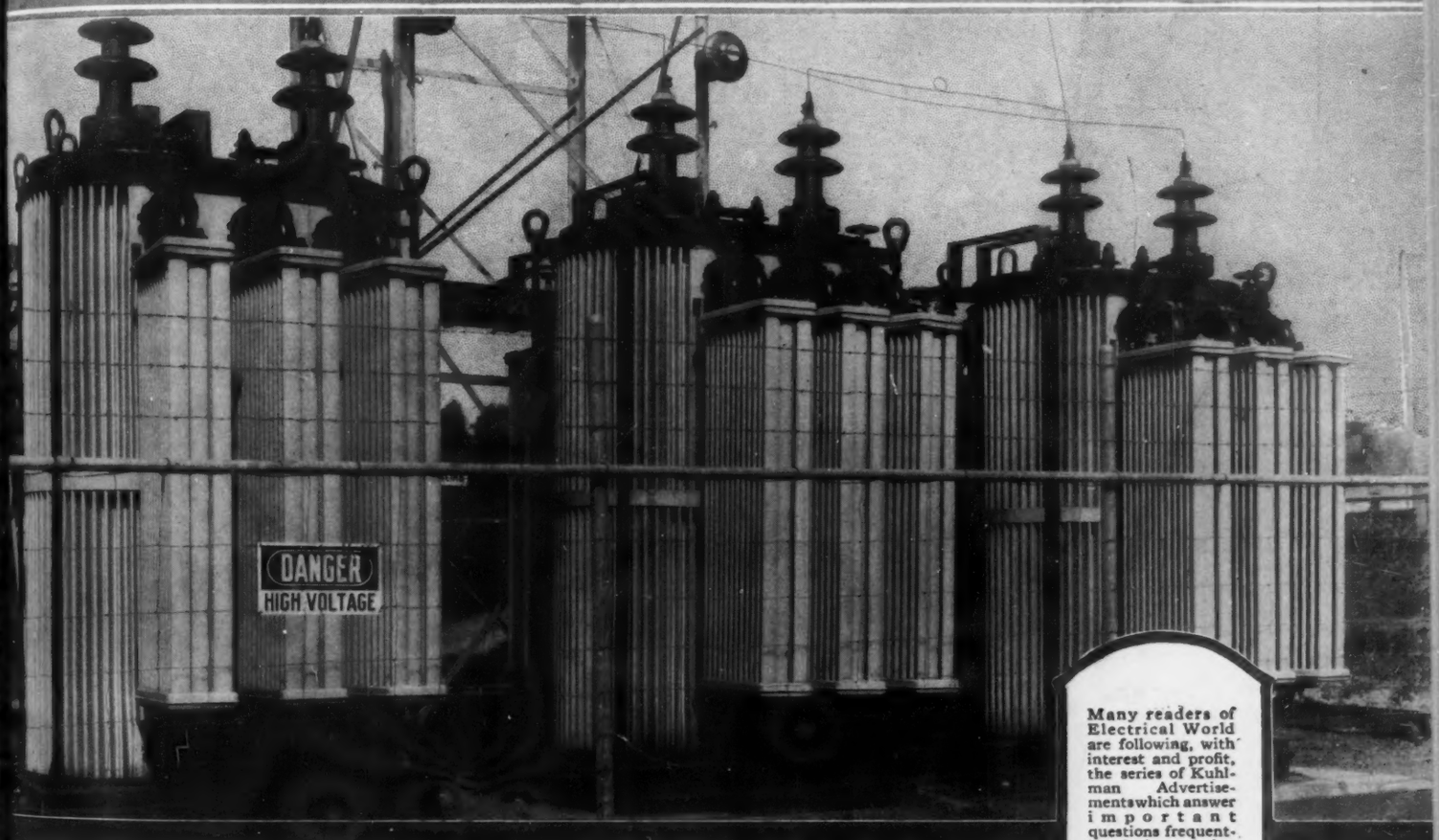

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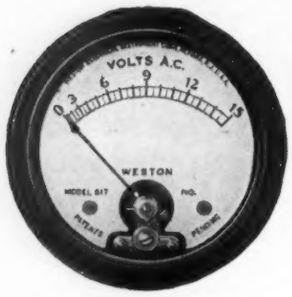

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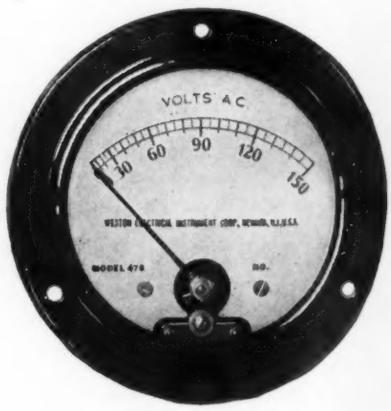

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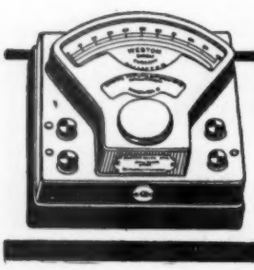

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THE editors of the ELECTRICAL WORLD have given the industry two examples of competency and service. The N.E.L.A. special issue represented months of detail work in an analytical study of the place and function of the holding company in utility operations. Records of years and many properties were studied before the stories were presented to readers. The N.E.L.A. report issue showed what coordinated team work by competent editors could accomplish in the way of getting a mammoth convention reported promptly and accurately. Three hours after the convention ended the ELECTRICAL WORLD was in the mails containing a complete report.

In the issue of June 25 the editors will present a detailed analysis of the range and water heater as a business and as a load. A national survey has been made and facts have been assembled and analyzed. Data which are complete and informative will be available to those interested in the load-building possibilities of these devices.

Behind the scenes in the editorial sanctum are the job of covering, reporting and interpreting four major conventions in June; the job of making national surveys on topics of vital importance to the industry; the job of planning work for the summer, fall and winter of equal magnitude and importance—these jobs are done because many editors with years of experience are inspired by enthusiasm for the industry they serve.

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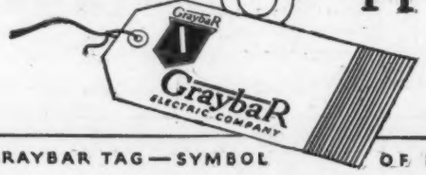


THE GRAYBAR TAG—SYMBOL OF DISTRIBUTION

Electrical World

Published by McGraw-Hill Publishing Company, Inc.
W. H. ONKEN, JR.
Editor

VOLUME 89 — *New York, Saturday, June 18, 1927* — NUMBER 25

Los Angeles Power Bureau Rebuked by Voters

THE Power Bureau of the city of Los Angeles, which at times devotes more attention to legislation and propositions for submission to popular vote than to its legitimate functions, has again been rebuked and discredited by the voters of that city. Unable to compete successfully with the Los Angeles Gas & Electric Corporation, it sought to purchase by force its more efficient rival, but in vain. Propositions Nos. 3 and 4, the first to condemn the Los Angeles Gas & Electric Corporation's system, and the second to build a steam power station in the harbor, were voted down quite emphatically at the election on June 7. Notwithstanding that the city system pays no taxes and that its rates are equal to those of the private corporation, which pays taxes and still shows a profit, the showing made by the municipal system did not convince the citizens that a change would be to their interest. Indeed, quite the contrary has been evidenced.

The condition of the accounts of the Power Bureau as revealed in a recent Superior Court hearing are most deplorable. Funds from bond sales are mixed with income from the sale of electricity, making it difficult for the court to determine whether the Power Bureau is solvent, and notwithstanding that the State Supreme Court sustained the Superior Court's decision directing the Power Bureau to cease spending public revenues for electioneering purposes, no heed was apparently given to the mandate of the court. Here we have political ownership at its worst.

Having been repudiated in its own city, it may be that the Power Bureau will hereafter attend strictly to its own business and endeavor if possible to meet competition rather than buy it up whenever it becomes more efficient. It may be also that the city of Los Angeles will consider the present situation as evidence of the inferiority of government in business. Its citizens, like all other citizens, desire sound, economic and honest government. The Power Bureau as an adjunct of that government has apparently given offense. Why, then, does not Los Angeles pluck it out and cast it from it, or must matters become worse before the voters are aroused to drastic action?

Inductive Co-ordination in the Field

INDUCTIVE co-ordination should be kept in mind from the first inception of a transmission line. Throughout the primary reconnaissance and the successive steps of right-of-way purchase, location and construction should be considered with a view toward producing the minimum inconvenience to communication.

For instance, it is often possible to choose from equally desirable alternative locations the one which affords the best separation from existing communication circuits. This does not mean that it will always be desirable to maintain a given separation from these circuits, but it does mean that any smaller separation should not be planned unless there are sound reasons for such a plan and unless the party constructing the line is willing to work out on an equitable basis the proper protection of the communication company's property. Similarly, there is no good reason why communication lines should be built in a location which is immediately susceptible to influence from supply circuits or directly in the path of sound expansion of power facilities when an equally desirable route or location can be found by a little work and study.

Providing for future expansion of present facilities involves other problems. For a number of years it has been the practice of the companies in the Southwest to send to the interested communication companies immediately upon the completion of plans the alignment map and a description of the line to be constructed, asking these companies to agree upon a transposition scheme or other protective measures and to make their recommendations in detail and in written form. These companies have yet to encounter a problem that could not be handled in this manner and have generally met an open-minded, helpful attitude on the part of the communication companies involved.

To remedy existing troublesome conditions, a cooperative spirit is still required, and careful study should be given to the recommended joint general practices before a solution is attempted; but the same principles will apply and the same results will follow if the proper attitude is taken by both parties.

The Worcester Rate Decision

INTEREST in the order of the Massachusetts commission reducing the maximum rate of the Worcester Electric Light Company from 7 to 5 cents per kilowatt-hour is industry-wide. The finding was a leading topic of discussion among delegates to the Atlantic City convention last week, although it had no standing on the program. At this writing the company has not announced its future course with respect to the order. Should the management carry the finding to the courts, it is clear that the reproduction theory of rate basing will be subjected to the acid test as regards Massachusetts practice. On the other hand, if the company decides to give the new rate a trial, the contrasting theory of fixing the rate base upon the invested capital will be under economic cross-examination.

The Worcester case is intertwined with the welfare of many other power companies. The company's circumstances are somewhat unusual from the standpoints of territorial compactness, diversity and prosperity. The previous maximum rate of 7 cents was as low as that of any private company in the state, if not lower. For many years the company has been plowing surplus

into plant instead of issuing new capital stock to meet the needs of expansion. On top of this investment it has been able to pay handsome dividends, serve the public well, voluntarily reduce rates from time to time and accumulate a very liberal surplus in cash. It is a reasonable assumption that the management's hesitation to reduce the maximum rate below 7 cents has been influenced by the possible effect of such a step upon other companies in the Bay State, many of which are less favorably situated.

Industry opinion is far from unified upon rate policies. Able minds regard the Worcester decision as radical in the extreme, while other minds equally competent believe that it offers the company a fair opportunity to develop class business with assured success. The Massachusetts commission has, in the opinion of able counsel, thrown its glove upon the ground, in the face of the United States Supreme Court decision in the Indianapolis Water Company case. The board stands ready to defend the Massachusetts rate-basing policy to the last trench. Assuming for the sake of argument that the Worcester decision might be overthrown at Washington, what would be the outcome? Every sane manager in this industry today realizes that its future commercial success lies in instituting lower prices as fast as these are justified, and that talk of raising prices on the strength of the mere legal authority to do so is political hokum and threatened financial suicide. The effect on public relations of insisting upon the full letter of legally determined rights is always something to be weighed very carefully, and if a company is in a position to test particular rates either throughout its entire system or over an authorized sector thereof, it may be the part of wisdom to make such a trial before resorting to the path of hostile litigation.

A Modernized Electrical Home

THE "modern electrical home" movement which has been under way for several years is recognized far and wide as a very important factor in educating the public to the possibilities of electric light, heat and power. Its effectiveness is due to the actual demonstration of lighting and appliances. Where such homes have been demonstrated, a marked increase in wiring, lighting and the use of electricity for convenience and comfort has resulted. But these modern electrical homes have been new houses, and their influence has been chiefly upon houses and apartments thereafter constructed.

There is a great market in the older houses and apartments in this country which has not been effectively developed. In fact, little is generally known regarding the manner in which to reach this market. Rewiring and refixturing campaigns have been instituted here and there, but the real key to the situation has not been found. Perhaps older houses and apartments are not considered important enough to warrant the trouble of rewiring and refixturing them. Perhaps this attitude is due to a common experience in large and rapidly growing cities, where these older homes give way to other buildings or are turned over to less prosperous residents. But this is a false view for the country as a whole. One-third of the population—nine million families—live in places having from a thousand to a hundred thousand inhabitants. In these towns and cities few of the houses are torn down or abandoned because of the feverish progress which is more common in large cities. Most of these nine million homes will endure for many years. They may need a new heating plant, some modern plumbing and new wiring and lighting fixtures. Why not in such a community get various interests together and demonstrate a remodeled house—modernized by electricity and the things that usually go with electricity?

Such a house is now being prepared for demonstration purposes by a household magazine. Electricity, and particularly lighting equipment—fixtures and portables—are to play a major part in its attractiveness. Will not electrical interests do well to think about this and be prepared to follow up the new movement? Millions of homes are awaiting re-electrification, and the commercial departments of electric service companies should work out a means of cultivating this field. Considering the satisfactory results to be expected from the "modern electrical home" movement, it appears that a campaign to promote it is full of promise.

Value of Counter-Shock as an Aid to Resuscitation Discounted

THERE has been much discussion in the past with regard to the efficacy of the so-called "counter-shock" or "counter-stimulation" as a method of resuscitation after electric shock. Men in the field have repeatedly observed that the victim who falls from a height, following a shock, is more readily resuscitated than one who does not have such a fall. This has been attributed to mechanical stimulation resulting from the body striking the ground, and the idea has led to the employment of some rather drastic measures of treatment.

The value of such treatment was not convincing to A. Campbell and Leonard Hill, who conducted an investigation about two years ago which tends to discredit it. Recent investigations by Prof. J. J. R. Macleod and associates at the University of Toronto, described by R. W. Ian Urquhart in an article "Experimental Electric Shock" (*Journal of Industrial Hygiene*, April, 1927), appear to confirm the views of Messrs. Campbell and Hill. Since counter-shock by mechanical means must act by bringing about stimulation of sensory nerves, with a resulting reflex excitation of the respiratory and other vital organs, experiments were conducted by Professor Macleod on rabbits which had received apparently fatal electric shocks. These consisted in stimulation, with faradic shocks of moderate intensity, of the central end of the sciatic nerve. No recoveries were obtained when artificial respiration was not at the same time applied. Furthermore, no evidence could be obtained, either in the behavior of the animal itself or in the arterial blood tracings, to show that such stimulation was having any reflex effects. Even in those cases in which the animal was kept alive by artificial respiration, it was impossible to detect any reflex effects on blood pressure or any improvement in the rate of recovery.

These investigators, therefore, were forced to conclude that counter-stimulation has no demonstrable effect on resuscitation from electric shock. The experiments made indicated that it is the nerve centers themselves that are paralyzed by the passage of current, so that impulses reaching them are completely blocked and the normal rhythmic discharge of the

respiratory center ceases, and since the nerve centers become insensitive to extraneous influences, counter-stimulation is not an aid to recovery.

The Hen or the Egg—Selling or Public Relations?

WISE men have never yet decided which comes first, the hen or the egg. But it looks as though an answer were to be found to the somewhat similar discussion that has been intermittently aired within the power industry. The trend toward solution was seen in the Atlantic City convention last week. Seven years ago a "Public Relations Section" was set up in the National Electric Light Association. Central-station executives had suddenly become convinced that it is not necessary just to trust to the Lord for the protection that lies in favorable public sentiment. They had discovered that definite things can be done to promote friendly interest among the people served by any utility. The idea caught hold rapidly and swept the industry. The highest officials of the power companies became enthusiastic and began to preach public relations, and a separate branch of the N.E.L.A. assumed the leadership. When the parallel sessions were on at the conventions the Public Relations Section would perform to a full house, while the Commercial Section meeting would be lean and little regarded in high places.

The commercial men felt it keenly. It is perfectly obvious to them that there is political protection in good public relations and that it is worth working for. But they also know that "public relations" is just another term for "pleasing the customer" and that the best and natural approach to a satisfied customer is good selling. For men and women who have come to depend upon electric service for their daily sweeping, laundering, dishwashing, cooking and refrigerating and the enjoyment of innumerable personal comforts, and who have found all their relations with the representatives of a power company pleasant and profitable, do not have to be perpetually told of its importance to the community. If they are customers, if they are stockholders and if they are friends of the salesman, the meter reader and the troubleman who serve them, then they will stand by that company in time of stress. Pleasing the customer is just as much a part of central-station selling as it is in the department store. And if the Commercial Section had not been weak and spiritless through that period of years, it would have been the sales managers who would have given leadership to this idea, and the new interest in pleasing the customer, selling him securities and winning his support against political attack would have centered in the Commercial Section and no Public Relations Section would have been started.

Last year there was a rebirth of confidence, purpose and hope in the Commercial Section. This year the reawakening of enthusiasm and the broadening activity have been conspicuous. The sales managers had long felt keenly the fact that the executives were not really interested in sales nor sympathetic with their plans and programs, and they became discouraged. Last year they staged a comeback, and last week, when the sections were meeting in parallel, public relations drew the smaller crowd, while in the commercial session there was standing room only. And this was no reflection either on the importance of public relations or on the excellence of that program or on the leadership which was given to that section this year, for all were of the highest. It meant simply that the power industry has at last begun to recognize the importance of sales.

Conditions in the market have forced the executive to turn his attention from engineering, operation and finance to this fourth fundamental function. And as the executive thinks, so goes the industry. The Commercial Section is now ready to merge into a natural relationship with the Public Relations Section. These two sections might perhaps be called the Sales Sections of the N.E.L.A.

"Too Many Contractors"—What Shall Be Done?

A THEME that has become very common in the electrical industry is based upon the obvious fact that there are too many contractors. Few persons, however, have any clear picture of how many there really are or how the condition is trending. Here are some figures, the most accurate estimate possible in this very fluid situation.

In the year 1920 there were 15,000 electrical contractors of all classes in the United States and they wired a total of 690,000 houses. In 1924 there were 22,000 contractors and 1,783,000 houses were wired. The number of contractors had advanced in these three years almost 50 per cent, but in the same period house wiring had increased about 160 per cent; so the growth seemed not unnatural. Since 1924 the volume of house wiring has fallen off, however. Last year 1,222,550 houses were wired, and this year the figure will be somewhere between 1,000,000 and 1,200,000. But in spite of this the number of contractors has continued to increase until today there are 30,000. That is, since 1924 wiring jobs have fallen 30 per cent in number, but the contractors have increased by the same amount.

Clearly these opposing trends cannot continue indefinitely. What is going to happen? It is a matter of profound importance to the electrical industry. And the condition presents a problem that is very personal to every manufacturer, jobber and power company, to say nothing of the contractor himself. One of two things must follow:

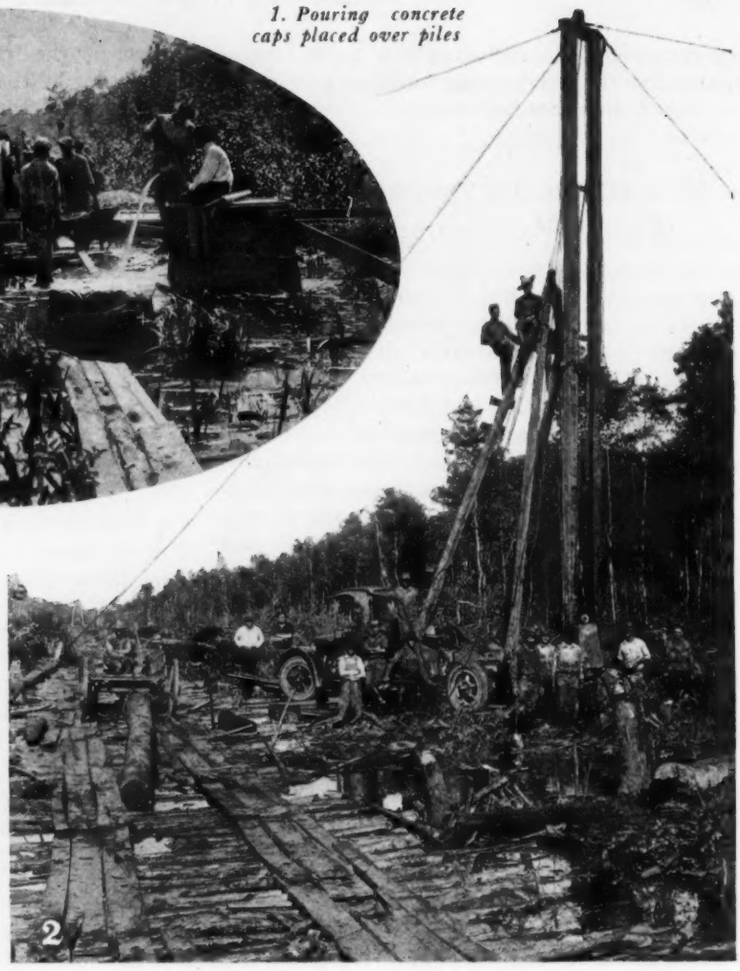
If the contractor is just left to his fate, his number will be gradually reduced by painful strangulation. But it must be remembered that the happy era of accumulating customers is over; and if the electrical industry is to continue its rapid growth, it must now turn to the completion of those almost 16,000,000 inadequate installations in houses now connected that are restricting the market for energy appliances, materials and apparatus. Why not employ this army of 30,000 contractors and get this job done quickly? And meanwhile why not go seriously to work to put the contracting industry on its feet by economic education?

Electrical men do not seem to recognize that the problem of the contractor is the problem of the entire industry. The Association of Electragists represents a fighting nucleus of 2,100. They are doing a good work. But they are powerless to guide or control the 27,900 other contractors who belong to no association and can't be reached. The manufacturers, the jobbers and the power companies cannot much longer stand aside and say: "It's not our business!"—because it is.

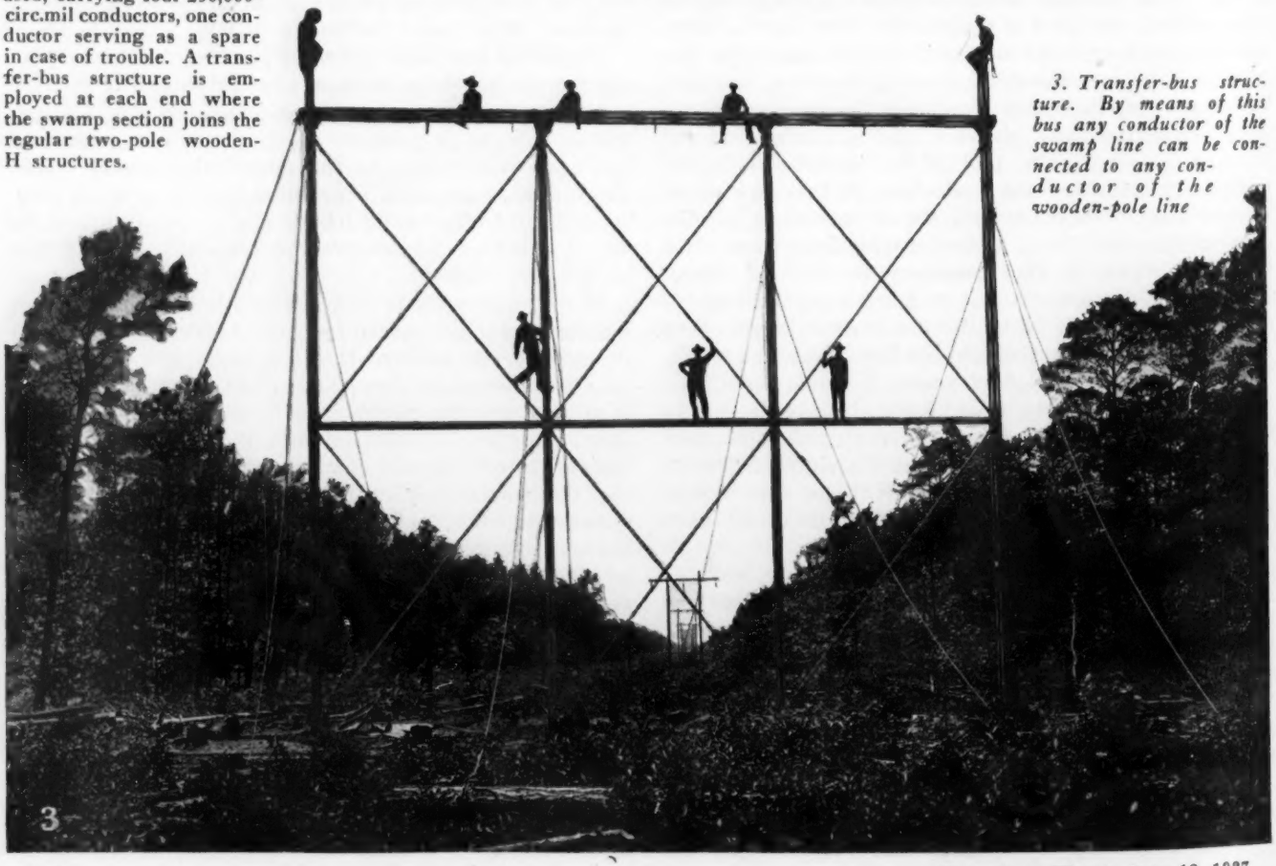
1. Pouring concrete caps placed over piles

Building 110-Kv. Line Through 5-Mile Swamp in Alabama

CONSTRUCTION difficulties with which the Alabama Power Company had to contend in running the transmission line between Flomaton and Mobile, Ala., are indicated in the accompanying illustrations. The greater part of this line is similar to the one described in the ELECTRICAL WORLD of Jan. 29, 1927, page 242. However, there is one 5-mile section that runs through a swamp which in wet seasons is covered with about 6 ft. of water. In this swamp a special H-frame Truscon suspension structure with three uprights is used, carrying four 250,000-circ.mil conductors, one conductor serving as a spare in case of trouble. A transfer-bus structure is employed at each end where the swamp section joins the regular two-pole wooden-H structures.



2. Driving pile foundations for swamp structures



3. Transfer-bus structure. By means of this bus any conductor of the swamp line can be connected to any conductor of the wooden-pole line

Budget-Plan Load Dispatching

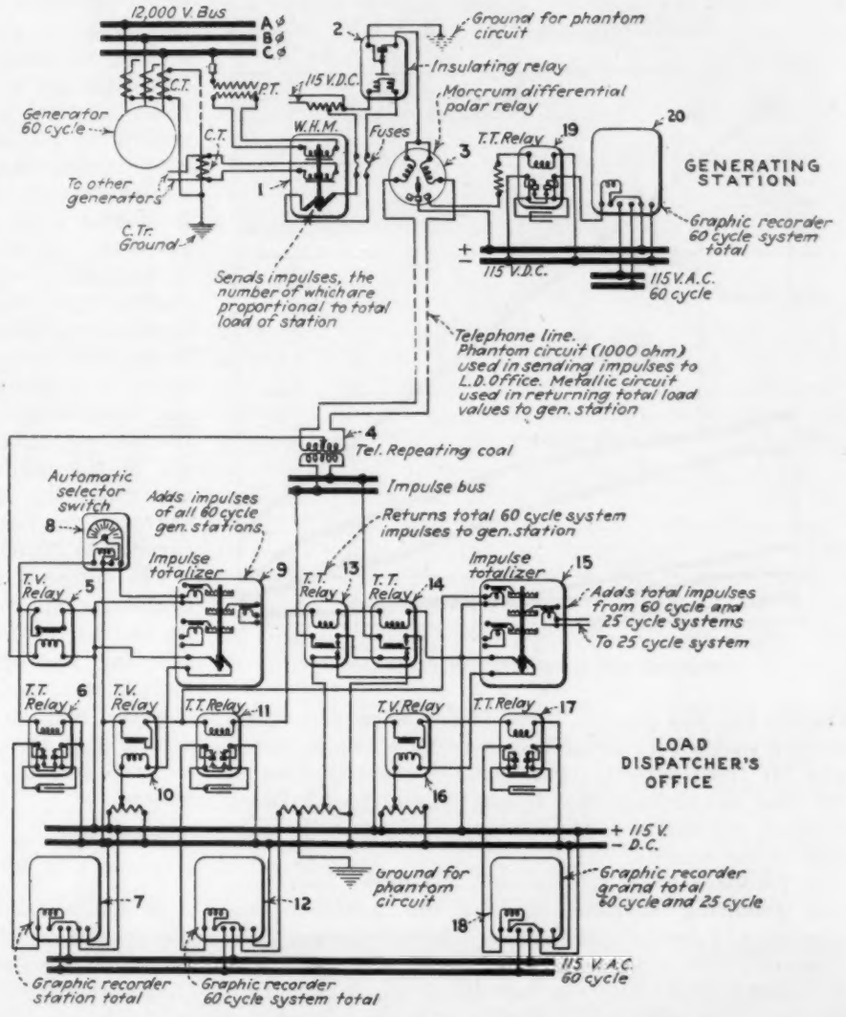
Deficiencies of Common Means of Load Apportionment—Remote Metering Totalizes Plant Loads and Furnishes Continuous Indication of System Condition to Load Dispatcher and to Plant Operators

By P. B. Juhnke* and L. N. Moore†

LOAD dispatching is being transformed into power control on the budget plan. The load dispatcher has to prepare the budget, and his duties have grown in number to such an extent that he is more than ever occupied. It was different in the olden days. Then the load dispatcher sat in a small office, made a blueprint of the system and commenced to operate. The things he had to look after were not many, because his dominion was small. Therefore he had to keep himself busy by doing things he could justify as important and enumerate as his specific duties, but which actually were of little moment.

At first, with the growth of the business, duties merely increased; later they multiplied. Not only mere routine grew but new duties became apparent, and of these, load division between stations was not the most taxing but was the one giving rise to most disputes and arguments and at the same time having greatest economic import.

Load dispatching had its start with only one principal station, and with this set-up of one principal and a number of reserve stations the problem was simple enough. Where, however, four or five stations of relatively different thermal performance are supplying the interconnected system, the problem of intelligent control assumes vastly different dimensions.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B
C
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Insulating relay
Morcrum differential polar relay
115 V.D.C.
P.T.
C.T.
Generator 60 cycle
W.H.M.
Fuses
T.T. Relay
GENERATING STATION
To other generators
C.Tr. Ground
Graphic recorder 60 cycle system total
115 V.D.C.
115 V.A.C. 60 cycle
Sends impulses, the number of which are proportional to total load of station
Telephone line. Phantom circuit (1000 ohm) used in sending impulses to L.D. Office. Metallic circuit used in returning total load values to gen. station
Tel. Repeating coal
Impulse bus
Automatic selector switch
Adds impulses of all 60 cycle gen. stations
Returns total 60 cycle system impulses to gen. station
Impulse totalizer
T.V. Relay
T.T. Relay
Adds total impulses from 60 cycle and 25 cycle systems
To 25 cycle system
LOAD DISPATCHER'S OFFICE
+ 115 V. – D.C.
Ground for phantom circuit
Graphic recorder grand total 60 cycle and 25 cycle
115 V.A.C. 60 cycle
Graphic recorder station total
Graphic recorder 60 cycle system total

SCHEMATIC DIAGRAM OF REMOTE METERING SYSTEM

There have to be considered the respective economies of the stations, the availabilities or limitations of tie lines between stations and the local service requirements of each generating center. In determination of these requirements there is room for argument and for divergence of opinion. One operating shift might quite properly consider one thing right and fair, to another the problem would wear a different face. On this account general rules covering all different specific cases were difficult to form and the need soon became apparent for more carefully planned procedure in load division or power control. There was thus gradually devised various schemes to govern the operation of large systems, all fairly progressive steps, but all having shortcomings and imperfections:

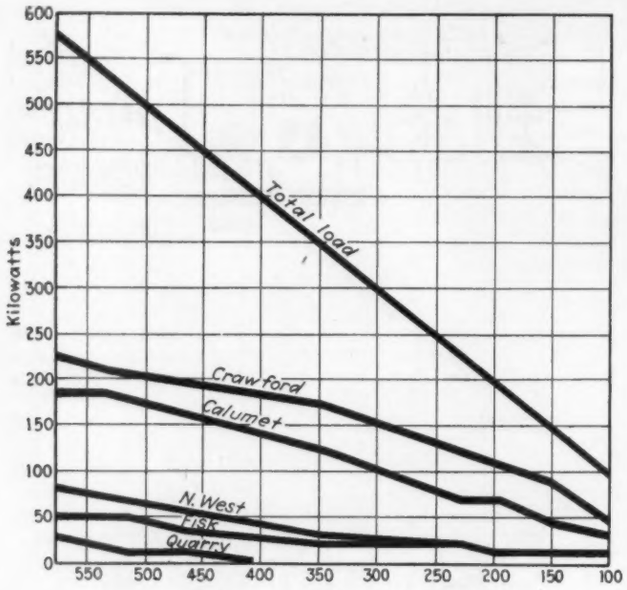
1. *Load Forecastings.*—This was resorted to first for peak purposes only, and was based on climatic forecasts. Later it was expanded to hourly prognostications. But for such forecasts to have definite value they should have considerably greater accuracy than forecasts generally have.

2. *Load Limits Scheme.*—This was the following development and purported to effect a load division based on certain known load limits for every period of the day. With a certain load variable for a given hour, fixed values were given to one, two or three stations, the fourth or others to carry the difference between the definitely assigned load and the actual load.

*Chief Load Dispatcher Commonwealth Edison Company, Chicago.

†Inside Plant Division Commonwealth Edison Company, Chicago.

To illustrate: The system load at a given hour varied between a known minimum of 160,000 and a probable maximum of 210,000 kw. Four stations were necessary to carry it. Station A was definitely assigned 80,000 kw., which figure was determined by any or all of the factors of capacity of generators, dependent load and tie line capacity. Station B was assigned 60,000 kw., determined in a like manner. This left a load ranging between 20,000 and 80,000 kw. to be carried by two other stations. Station C varied its load between 10,000 and 50,000 kw., whereas Station D had assigned a load between 0 and 20,000 kw. In this scheme Stations A, B, C and D are assumed to be progressively less efficient stations. Ordinarily the load would be about



SIXTY-CYCLE LOAD DIVISION DIAGRAM

185,000 kw. and Station D would not be needed. This scheme was a very great help over no schedule, but it was far from perfect. The variable quantity most of the time was so large that it had to be divided between at least two stations, thus largely defeating the purpose of the scheme.

3. *Totalized Load Scheme with Telephone Direction.*—A following development was the totalized load scheme, with load division effected by telephone. This, however, also had the disadvantage of considerable variation between directive periods or necessitated continuous telephoning. Nevertheless it was a helpful step forward.

4. *Totalized Load with Automatic Reverse Indication.*—This is the latest development along this line. With this scheme the individual loads of the different generating stations are totalized in the load dispatcher's office and the total is sent back to each generating station automatically and continuously. In this scheme each station is given, and has before it for instantaneous observation, the total system load as well as its own load. The third essential element is a load division chart, showing each station its own responsibility to the system for any given total load.

A sample of these charts for the 60-cycle systems in the Commonwealth Edison Company is shown here. These charts are prepared by the load dispatcher with the full co-operation of the generating station organization. In preparing them full account is taken of individual station performance, of load available and of the desirability of loading the efficient stations to the exclusion of the less efficient ones. Departure from these schedules takes place only when any one station is unable to meet its individual responsibility, in which case a load dispatcher's order assigns such deficiency of any one station to any other station or stations competent to meet it. This scheme in its entirety then gives each station all the information it requires for most intelligent operation and should result in worthwhile efficiencies.

This installation operates with fair accuracy. However, like all commercial instruments, these have a percentage of error. With the operating voltage kept at normal, the error is approximately 1 per cent. As this error, though slight, is likely to influence the system frequency, it is advisable to delegate one of a group of generating stations to do the regulating for this inaccuracy. The task rightfully belongs to the smaller and less efficient stations. However, as their capacity is not in service at all times, it being used mostly for peak purposes, and as a certain amount of reserve has to be maintained at all times anyway, the task of regulating for this meter inaccuracy in the Commonwealth Edison Company is assigned to the Calumet station.

The 25-cycle system is operated in like manner. Recently a 40,000-kw. frequency changer, tying the 25- and 60-cycle systems, was put into service. As this frequency changer operates according to a fixed schedule, mostly taking its input from the 60-cycle system and delivering it to the 25-cycle, the 25-cycle system shares in the benefits of the regulation for meter inaccuracies in the 60-cycle system.

The intended function of the frequency changer is to take its input from the efficient 60-cycle excess capacity and deliver its output on the 25-cycle system, thereby relieving less efficient capacity. Under certain conditions of system requirements the direction of feed, however, may be reversed; but no matter which is the direction of feed, the frequency changer output is not metered, but its input appears as load on the supplying system.

Description of Metering System Which Combines 25 and 60-Cycle Totals

To follow intelligently the description of the system, the schematic diagram is referred to. It should be borne in mind that the individual loads of different frequencies are separately totalized in the load dispatcher's office; while the 25 and 60-cycle totals are also combined in a grand total, only the 25 and 60-cycle totals separately are transmitted to the different generating stations involved in their production. The description, therefore, deals with a system of only one frequency, that for the other frequency merely being a duplicate.

The total load of a generating station is obtained by a special polyphase watt-hour meter (1), operating as a single-phase meter. A special current transformer, one for each generator, is placed in the secondary of the regular instrument current transformer on one phase. The secondaries of all these current transformers are connected in parallel and jointly in series with both current coils in the watt-hour meter (1). This meter, therefore, integrates the station load as single-phase load, but is calibrated on the basis of three-phase or total station load.

This watt-hour meter is equipped with a small commutator-like interrupting attachment on its spindle. It alternately makes and breaks a direct-current circuit and creates impulses the frequency of which varies directly with the speed of rotation of the wattmeter shaft and therefore directly with the total load on the station.

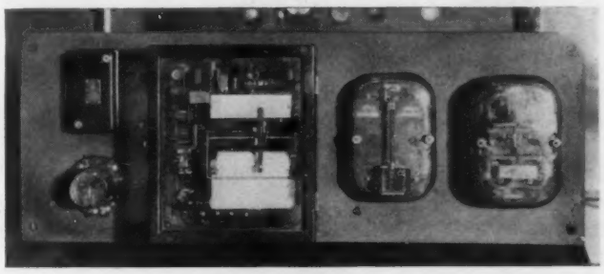
These direct-current impulses operate an insulating relay (2) between the watt-hour meter (1) and the Morcrum relay (3), or more particularly the telephone line. The insulating relay, which has 7,500-volt insulation between operating coil and contacts and is specified by the telephone company for protection of its equipment, simply relays the impulses as they are received. The new impulses created by the insulating relay (2) are now sent to the load dispatcher's office over a telephone line, which is operated as a phantom circuit. This circuit is made up of a Morcrum differential polar relay (3) at the generating station, a telephone repeating coil (4) at the load dispatcher's office and a connecting telephone line between. The operating coil in the Morcrum relay (3) is tapped in the center for this phantom circuit, and is therefore balanced and will not operate with the impulses from the insulating relay.

The impulses are received at the load dispatcher's office by a type TV voltage relay (5). This relay, in turn, operates two local circuits—one the operating coil of a type TT telephone or reversing relay (6), the other the operating coil of an automatic selector switch (8) or an operating coil in the totalizer (9), or both serially when necessary.

Taking the first of the circuits, the impulses received from the voltage relay (5) operate the reversing relay (6), which causes the condenser across its contacts to charge and discharge through the winding of a graphic recorder (7). The reversing relay sends to the recorder two impulses for each impulse received. The recorder (7) is a standard direct-current indicating graphic voltmeter and is equipped with a glycerine dashpot to give smoother movement. The effect of the series of impulses from the reversing relay (6) is balanced against a coil spring, the impulses tending to close a contact, causing the operating motor to run in a direction that will move the pointer to a position indicating load, the spring tending to close a contact to make the motor move the pin to the zero load position.

The totalizer (9) consists of a series of differentially geared ratchet wheels, coupled together on one shaft, which at one end has a small commutator-like interrupter. The ratchet wheels are operated by mechanically controlled pawls. The gearing is arranged in such a way that the speed of rotation of the shaft is proportional to the sum of the speeds of the various ratchet wheels.

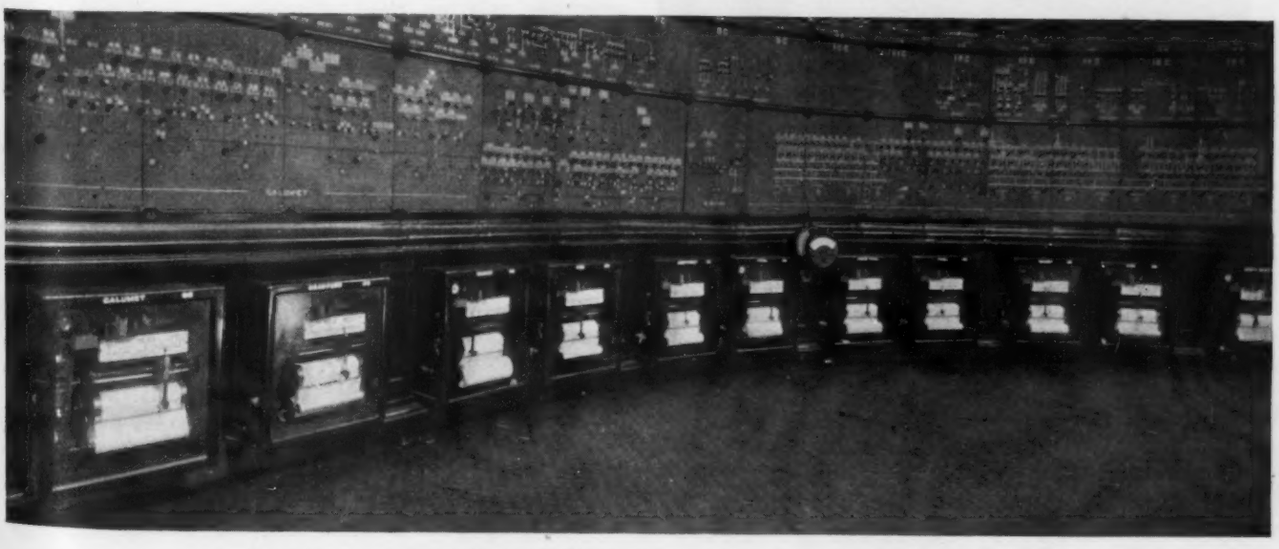
The commutator-like interrupter serves to produce, in a new circuit, impulses the frequency of which varies directly with the sum of the speeds of the ratchet wheels. Since each wheel is operated by impulses from one of the incoming station lines, the impulses from the interrupter of the totalizer vary directly with the sum of the impulses from all the stations and therefore directly with the sum total of the load of the stations the impulses of which are being received. Each totalizer can add the output of three stations. If more than three stations have to be totalized, additional totalizers must be used.



SENDING AND RECEIVING INSTRUMENTS IN CRAWFORD AVENUE STATION

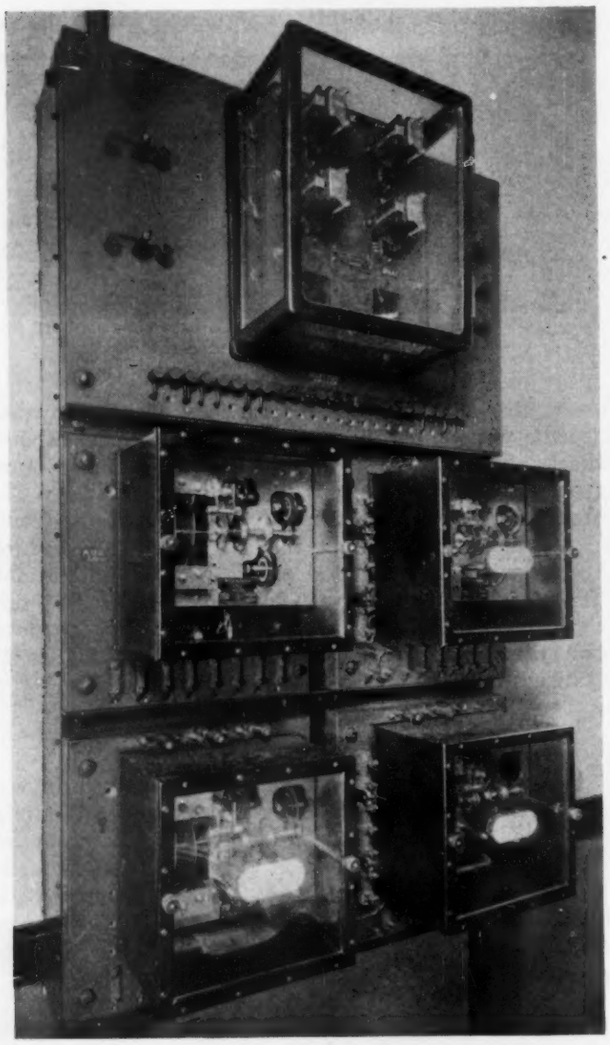
MAIN TOTALIZER IS EQUIPPED TO INTEGRATE TOTAL OUTPUT OF SEVERAL STATIONS

Any number of totalizers may be combined into a main totalizer, similar in every respect to the totalizer (9), through the summing up of the impulses produced by the interrupting devices at the end of each of the totalizer shafts. This main totalizer is equipped with a geared frame to integrate total output of the combined stations. The same impulses that operate the totalizer also operate, when desired, an automatic selec-



REMOTE METERING STATION RECORDERS MOUNTED BELOW LOAD DISPATCHER'S BOARD

tor switch (8). Such a switch is installed in connection with totalizers for the smaller stations, which carry lighter loads, and whose OA wattmeters, on account of lighter loads, would send exceedingly slow impulses, which would result in racing of the indicating recorder. To secure smoother action, the OA wattmeters at the smaller stations are speeded up to send in multiples of their correct numbers of impulses. The selector switch reduces these impulses in the transmission to the totalizer in proportion to the speeding up of the OA wattmeters at the generating stations.



SELECTOR SWITCHES AND IMPULSE TOTALIZERS IN LOAD DISPATCHER'S OFFICE

The impulses from the main totalizing instrument similar to (9) operate a type TV or voltage relay (10), which, in turn, produces duplicate impulses in two circuits. This TV relay (10) is used to permit the operation of the totalizer on a very low voltage, thus allowing very delicate construction in both interrupter and brushes.

The first of the aforesaid two circuits consists of three type TT or reversing relays (11, 13 and 14) in series, one (11) with a condenser, and two (13 and 14) with no condensers, but operating as a unit. The second circuit consists of an operating coil and a grand totalizing instrument (15) totaling both the 25 and 60-cycle systems.

Taking up the first of the last two circuits which receive impulses of the total load, the first type TT reversing relay (11) with its condenser operates another graphic recorder, which indicates and records the total system load, 25 or 60 cycle. The operation of this relay and recorder is exactly the same as that which records the individual station load, as previously explained.

This completes the description of the set-up to a point of totalization, indication and recording in the load dispatcher's office.

Explanation of the Method for Securing Reverse Indications

For reverse indication the following is pertinent:

The two specially wired type TT relays (13 and 14), with their impulses proportional to the total load, operate simultaneously and produce, without the use of condensers, another series of impulses, also proportional to the total load. These impulses from the reversing contacts of the two relays (13 and 14) are alternately positive and negative. They pass through the primary coil of the telephone repeating coil (4) for all station telephone lines. The secondaries of the repeating coil (4) in the load dispatcher's office form, with the telephone lines and the operating coils of the Morcrum differential polar relays (3) at the stations, metallic telephone circuits. The alternately positive and negative impulses in the primary of the repeating coil (4) at the load dispatcher's office produce impulses in the secondary that are directly proportional to the total load. These alternating impulses now operate the Morcrum polarized relays (3) at the generating stations. The Morcrum relay operates a local circuit, producing another set of impulses again proportional to the total load. These impulses now operate a type TT reversing relay (19) with a condenser. These resulting impulses in turn operate the indicating graphic recorder in a manner similar to those in the load dispatcher's office and indicate and record thereon the total load as totalized at the central point. All generating stations receive these impulses simultaneously.

This gives a complete description of the system for one frequency. Generating stations that have both 25 and 60-cycle generating capacity have the set in duplicate. The outputs of reserve generating stations, which operate only on peak, purchased power from other companies, and battery discharges, are not included in the total on account of cost of equipment. Their outputs are separately regulated according to schedules or in response to telephone orders, but load thus carried disappears from the total generated and therefore does not interfere with the scheme as pertaining to the principal stations.

In the scheme installed in the Commonwealth Edison Company metallic telephone circuits are used, but it is understood that the impulses can also be transmitted over radio or the carrier current system, which very materially enhances the usefulness of the scheme.

The installation appears complicated, and it is not at all simple. Nevertheless, it has within it the elements of an enabling means. It no doubt makes possible the most intelligent operation of large interconnected systems, offering as it does a comprehensive perspective, which should translate itself into economies on a sufficiently large scale to more than warrant the cost of the equipment and set-up required.

Utility System Planning and Operating Procedure*

Voltage Standardization, Protection, Stability, Isolation of Supply Sources, Load Control, System Operation, Effects of Interconnection and Utilization Problems Considered

THE activities of the electrical apparatus committee (H. R. Woodrow chairman) have called for a division of the work into five functional lines for detailed analysis: (1) fundamental plan of systems; (2) operating methods and operating routine; (3) generating stations; (4) substations and (5) utilization equipment. Arrangements have been made for interchange of information with engineers in foreign countries.

H. R. WOODROW

Basic Factors in System Planning

In the conception of the fundamental plan of a system basic factors have arisen such as (1) principles of standard connections and intersystem connections, (2) voltage standardization, (3) protection schemes, (4) system stability, (5) isolation of supply sources, (6) phase isolation and (7) load control. Each of these factors has received serious consideration, but only a few have reached a stage sufficiently complete to justify a report.

Nearly as many detailed schemes of system connections seem to exist as there are systems, although the local conditions have usually determined minor variations. In general, however, these schemes do not depart widely from a few fundamental lines, and a code of principles for the development of system connections and intersystem connections is in the formulative stage. This report outlines the economic and technical features of such connections.

The inability of central stations properly to forecast their load conditions has led to numerous uneconomic developments. Load forecasting is recognized as a difficult proposition, but it develops that the determination of some of the fundamental principles of load forecasting is possible and will be of value to all as a basis for system planning.

The selection of voltage for system developments has led to a wide variation, primarily due to the fact that there has not been set up any preferred limits as a mark which all of the central stations might use as a guide. The committee has, therefore, attempted to study the reasons for a logical voltage selection and has established a series of preferred values (see ELECTRICAL WORLD for May 14, 1927, page 1010). Although the values selected do not meet all of the requirements of present-day developments, they do set up limits which the committee feels will meet the requirements of any new development and around which we may gradually develop our systems until we may reasonably reach these limits. With the expansion of systems and the interconnections of one system with another, the selection of some common preferred limits should tend materially to facilitate these interconnection problems.

Although the committee has as yet been unable to devote much thought to the study of phase-angle relations, it is recognized that phase-angle standards will require careful analysis in every interconnection problem, and detailed studies will be followed along this line as soon as possible.

Relaying and System Stability

Every interconnection calls for exacting relay and reactor adaptation in order that troubles may be sectionalized without affecting a wide range of service. The engineers have met this problem in numerous ways. One plan breaks the systems apart in predetermined points on relatively minor disturbances, as well as major disturbances, with generating equipment on each section sufficient to carry the load, whereas another method may have diversified interconnections between power sources so that any trouble would affect only one of the several tie lines and the trouble

*Abstract of report of the electrical apparatus committee at the N.E.L.A. convention, June 7, 1927.

be localized without separating the major power sources.

These various schemes of development have led to a careful study of system stability, which has determined the selection of line characteristics to give maximum power transfer. The use of synchronous condensers and synchronous generators at different points on interconnected systems has been applied for a number of years, and experience has shown that the stabilizing effect of these units at the various points of the system has been a big factor in improving the stability and maintaining reliable service during disturbances. Some companies are making special tests to insure stable operations as their system expands over wider and wider areas. Essential data of this character are being collected.

To increase the continuity of electric service companies have in general separated their generating units by considerable electrical distance in the use of sectionalizing reactors. This has in effect divided systems up into a network from which customers are served but supplied by a number of generating stations electrically some distance apart, although physically the several units may be located on one site. This has led to an interesting analysis considering the possible use of generators directly tied into a low-tension network, at which point the paralleling would be made of the individual generating units. More definite data will be available in the near future.

The isolation of phases in generating stations has, in general, been effective in limiting the short-circuit currents on generating station apparatus, and no serious generating station electrical troubles have been reported during the year's operation.

There has been a rather broad extension of the use of alternating-current low-voltage networks during the year, and in all cases it appears that very satisfactory results have been accomplished, with improved continuity of service. Although some of these systems have been in service for several years, with a reported remarkable improvement in continuity of service, the extensions to numerous other systems which are being placed in service this year will be very carefully watched and reported as a supplement to a previous serial report which covers the subject of alternating-current low-voltage networks.

Operating Problems Receive Particular Attention

With the extensions of systems and their interconnections the operating problems have become rather complicated, and a serious attempt has been made to analyze these for the benefit of operating forces. Operating organizations have been developed along numerous different plans, each one of which may be perfect for a system as it exists today, but serious modifications will be required with the expansion to include other stations or systems of tomorrow. Considerable progress has been made in arriving at some of the fundamental bases on which these organizations are developed, and this information should be available within a relatively short time.

The method of dispatching is a vital factor in insuring high continuity of service and the economical production of electrical energy. Such factors as distribution of load among generating stations, reserve capacity, routine and emergency switching, maintenance and repair of equipment and methods of reporting and recording vary with local conditions, but with expansions each local condition is being modified by interconnections which will ultimately lead to a greater uniformity of practice.

The preparation of information on load dispatching between interconnected systems, both under the same and under different management, especially where relaying of power becomes necessary for drought, high water, breakdowns or other abnormal conditions, may be of interest, as well as the communication facilities that have been developed for extended operations. The use of wireless telephony has become very effective with the improvements in this class of equipment and it is felt will be of such valued assistance that a definite wave band is being requested from the government for the use of operating companies.

The inspection, maintenance and repair of electrical apparatus are of vital importance, both as to cost and continuity of service. The committee has started out to analyze the various methods of scheduling and recording work, the interval of time between inspections and the thoroughness of inspection, with the results obtained.

Automatic Equipment an Important Factor

Automatic equipment has played an important part in operating methods, and as this equipment has become developed to a more reliable state it is being relied upon for many of our major features in operation. This was started by the necessity of quick-time elimination of faults by automatic relays and has grown to the present-day complete automatic operation of generating stations and substations. Equipment of this type, if properly developed and installed, can be relied upon continuously and is not subject to the human element of operating men. A much broader use will not only reduce operating costs but improve continuity of service and reduce the likelihood of labor difficulties.

Automatic and remotely controlled substations have been used to a considerable extent and have become an important factor in system developments, both as to increased continuity of service and reduction in costs. There has been enough experience on these stations to justify the publication of a serial report, which will be available within the near future.

Special attention has been given this year to the study of generating stations when considered as a unit in an interconnected system, which materially affects not only the design but the methods of operation. A few years ago a generating station was considered as an independent unit, whereas today it forms only a part of an interconnected system, thereby making possible the elimination of numerous duplications of auxiliaries which were required in a single station of a system. This elimination of excess duplication is tending to simplify operating problems as well as to reduce costs.

The reduction in the number of reserve auxiliaries has naturally led to the development of the highest grade of equipment to eliminate the numerous outages that have been experienced with minor pieces of equipment. Guides for specifications of this equipment have been formulated and sent out to member companies for their assistance in securing the best type of equipment.

No major troubles have been reported on large generators, and although these units are becoming larger and larger, it appears that the designing engineers have met the problems with greater data in hand and better materials. The generator no longer limits the size of turbo-generator units, and low-temperature units are available for almost any size of turbine.

To simplify generating stations, switching is being reduced to a minimum, and where high voltages are being delivered from the generating station, transformers are being directly connected to generating units more extensively.

It has been the practice for a number of years among the larger metropolitan companies to rely on hand regulation for voltage within the generating station, as the fluctuations in load are a relatively small part of the combined system load, whereas in the hydraulic stations with heavy transmission lines, or smaller stations supplying heavy industrial centers, the fluctuations of load become a big factor which has required automatic voltage regulation. The installation of materially larger units in metropolitan stations and their interconnections with heavy feeders have again opened this question owing to the necessity of insuring continuous operation with the loss of one of the major units, which condition may throw a heavy load on the remaining units. The tendency of manufacturers to reduce the short-circuit ratio in the development of larger units has also resulted in a greater drop in voltage with increased loads thrown on the unit. These conditions have created an incentive for quick-response voltage relays to insure increased stability between generating stations and more reliable voltage control. Improvements in the development of quick-response voltage relays have relieved some of the objections to automatic control, and all of these factors may lead to a more general adoption of automatic regulation in the larger metropolitan stations.

Experience with manually operated substations was covered in a serial report, but additional improvements have been made, especially with the increase in the number of operating companies supplying railway loads and network systems, and a supplement will be presented covering this subject.

With the increased number of operating companies testing oil circuit breakers and the increased facilities made available in the manufacturing plants for testing this equipment, the oil-circuit-breaker situation is reaching a stage of more definite determination. Few cases have arisen where the equipment was not capable of interrupting short-circuit currents up to the limits specified by the manufacturer and, in general, it is felt that the manufacturer's figures can be relied upon.

Some progress has been made on the development of interrupting devices other than of the oil-filled type, and the committee is co-operating with the manufacturers in every attempt to perfect some line of equipment of this type.

CODE SITUATION

A number of companies have been confronted with special code requirements, and the subject of codes has been up for consideration for several years. Several of these codes have been very carefully analyzed, and it is felt by the committee that every one should be sent to the American Engineering Standards Committee for inclusion, if desirable, into one of the two recognized national codes of this country. In order that equipment throughout this country may be universally applicable, it is desirable to have all codification made a national issue, and the set-up of the American Engineering Standards Committee has provided means for bringing all of this work within one group, with proper representation of all parties concerned. The American Engineering Standards Committee has already adopted the two fundamental codes, the National Electrical Code and the National Electrical Safety Code, covering the two features of fire hazard and safety, and these two codes can be amplified if necessary to cover all installation requirements within stations and on customers' premises. The committee has therefore gone on record as recommending the co-operation of the N.E.L.A. in these two codes and asking that all codification that any one feels is desirable may be directed through these channels.

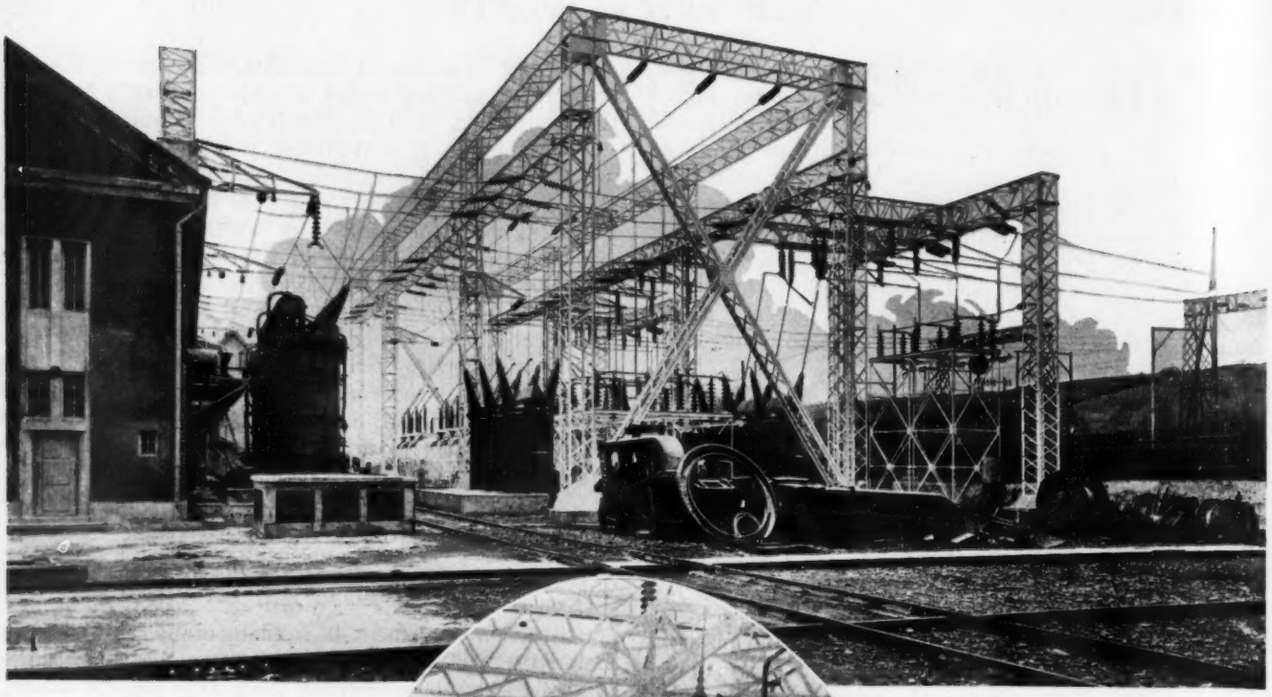
PROBLEMS OF UTILIZATION

Utilization equipment is fundamentally a problem of the commercial man and the engineer, and the studies have therefore been carried along this year in a very close correlation with the Commercial National Section. Commercial men naturally feel that the engineers are too rigid in their rules as to the type of equipment permitted on their system, and engineers have been inclined to feel that the commercial men have not considered the line requirements of the equipment that they are contracting to serve. The motor rules have therefore been under close review for revision into whatever form may seem most practicable and at the same time induce the development of the best type of motor equipment for appliance use, consistent with cost.

The voltage rating for apparatus to be connected to the system has been under careful review, especially in line with the general tendency of adopting low-voltage alternating-current networks in the heavy load centers throughout the country. The five-phase, four-wire system naturally requires a higher lighting voltage if standard 220 volts is to be supplied for the three-phase circuit, or a lower voltage will be supplied to the motor if standard 115/120 volts is supplied to the lights. In places where the three-phase, four-wire network has been in operation, the 200/210 volts supplied to the customer has given very little trouble, although each of the companies has been prepared to meet the situation should the trouble arise. This subject is under close review with the manufacturers and some definite recommendations may be expected within the near future.

The power-factor correction problem has existed for a number of years without a definite solution having been reached and possibly without a solution being possible, as too many factors are involved requiring local consideration. However, this problem, too, is under review with the hope that some solution may be brought out to improve the power factor of loads.

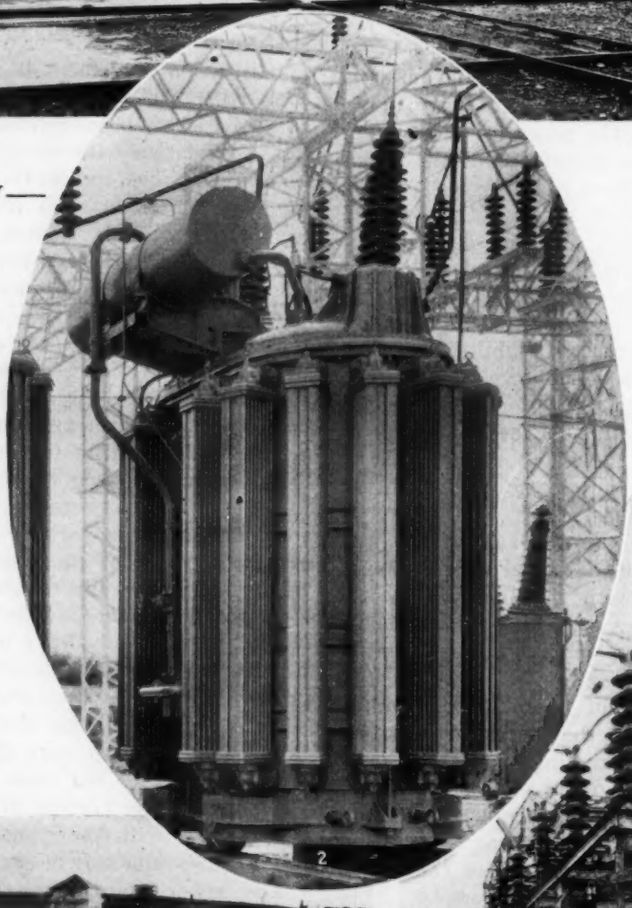
Customers have experienced considerable trouble with low-voltage releases tripping off their equipment at times of system disturbances, although these disturbances may have been of only momentary character. The committee has co-operated with the manufacturers in the development of low-voltage releases with time delay, and it is expected that these will be available for commercial production within the near future.



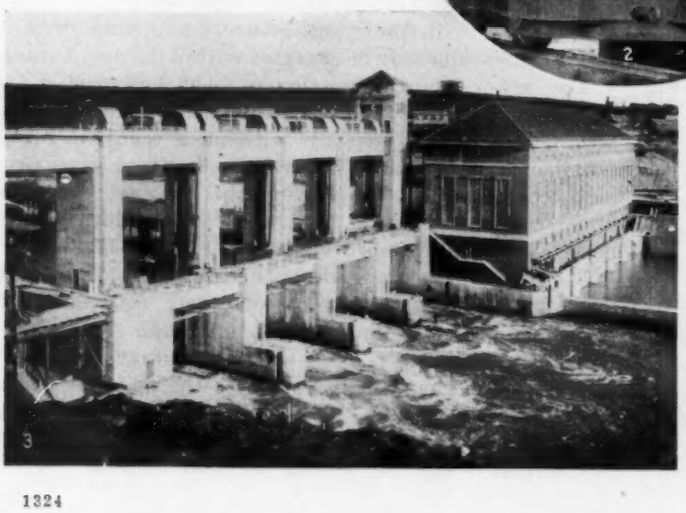
Chancy-Pougny—

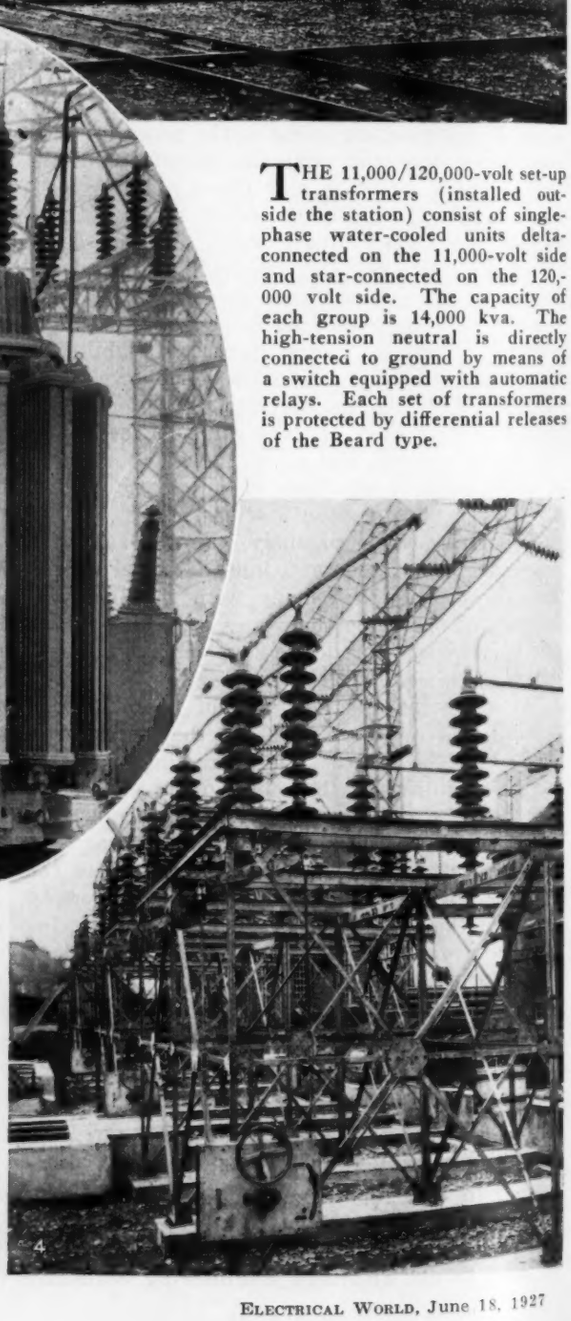
A Typical European Hydro Development

SITUATED on the Rhone River between France and Switzerland about 10 miles downstream from Geneva is the Chancy-Pougny hydro-electric plant, which delivers energy at 120 kv. to a transmission line 87 miles long and having a capacity of 16,000 kva. Equipment of the plant comprises, according to M. Barrère, consulting engineer, Paris, five Francis vertical turbines, each of which requires 92 cu.m. of water per second to develop about 8,700 hp. (7,000 kva.). The generators operate at 10,000 to 11,000 volts and are of the vertical type equipped with shunt exciters on the shaft end.



THE 11,000/120,000-volt set-up transformers (installed outside the station) consist of single-phase water-cooled units delta-connected on the 11,000-volt side and star-connected on the 120,000 volt side. The capacity of each group is 14,000 kva. The high-tension neutral is directly connected to ground by means of a switch equipped with automatic relays. Each set of transformers is protected by differential releases of the Beard type.





Methods, Money and Management*

Standards Are Useful Only to Buyers and Sellers—Policy and Procedure in National and International Standardization —Strengthening of A.E.S.C. Urged

By William McClellan
McClellan & Junkersfeld, New York, N. Y.

CONFIDENCE is the basis of easy merchandising. Faith in the salesman, faith in his company, faith in the goods, overcome any amount of buying resistance. Faith in the buyer and in his credit brings forth the most generous offer of price and service. Such salesmen and buyers greet each other as friends whenever they meet and the business is easily arranged. Too often, however, there is only too little faith. Hope is present at the time of purchase and much charity is needed when the goods are delivered.

The order of importance of the several faiths is undoubtedly first the goods, second the company and third the salesman. Intelligent salesmanship and excellent service in time of grief are fine adjuncts, but the relative significance of both diminishes as the goods become more nearly perfect. Obviously, if the goods are perfectly designed and well made, little service will be needed. If the goods have been well tested so that the results of use can be predicted accurately, the salesman has no difficulty in performing his principal function—that is, to make sure that the buyer is getting just what he thinks he is getting and that it will serve his purpose adequately.

Buying and selling in industry are highly professional tasks. They are to be distinguished from mere order taking, which is a common workman's job. Buying and selling are not antagonistic, but they are radically different. The effective salesman must be certain that his goods are quite the best in their particular classes. Theoretically, all his comparisons must have been made previously to his going out to sell, and he must be convinced that all deficiencies have been remedied.

The buyer has the task of comparing the offerings of various salesmen. At the beginning he has tried to know definitely what he wants. He has tried to describe what he wants accurately in his specifications. Now he must decide which offering will give him the highest quality and satisfaction for the money he spends. This 50-ton crane is heavier than that one, but is the extra weight an advantage or disadvantage, and perhaps the heavier crane costs less. How does the workmanship of the two compare? What is the value of the special features in one for easier control, greater safety, lower power demand and, perhaps, more flexible service?

What about these three makes of induction motors, all offered under the same specification? They seem to vary in weight, mechanical sturdiness, etc. They all have different features for starting and speed change. Their efficiencies, power factors, air gaps, heating vary independently, but perhaps so as to compensate one another to some degree. Their reliability, maintenance, operating costs and other features must be properly investigated. There is the net balance of weighted values with any difference in price that may be demanded. Finally, on delivery how is the product and its performance to be measured against the specifications?

All these complex comparisons and adjustments could be worked out for each particular sale. This is what is done in the early stages of any art. It is very expensive in time, money and worry, and the product is likely to be more expensive because of the greater uncertainty in regard to the interpretation of the specifications at acceptance. As the particular art grows and transactions in it become more and more frequent, an attempt is started to systematize the transactions as much as possible by the introduction of "standards."

Now, the first thing to be remarked is that a "standard" is a facility for commerce. There is no use for a standard until you buy and sell. In fact, there is no use for a standard until you buy and sell rather frequently. There is no such thing as a standard suspension bridge. There is a standard 10-hp. motor. The other day, in talking with an automobile salesman about a new car, I asked what gear shift it had. "Standard," was the quick reply. I didn't know which one it was, but I knew it must be right.

A "standard" is always a definition, but often more than the definition of a mere term. Long after science had defined a horsepower and a kilowatt there was much uncertainty as to what was meant by the horsepower or kilowatts of an engine or a motor. Pounds and kilograms were known definitely for many a year before it was known just what was meant by the tensile strength of cement or steel.

Standards Benefit Only Buyer and Seller

It is clear that "standards" benefit only the buyer and seller. They enable both parties to know just what they are exchanging and how to determine it on delivery. A man building a machine for his own use has no use for standards if he is going to make or have specially made every part of it. An engineer has no use for standards in his designs except to reduce the first cost and cost of maintenance for his client. In the days before there were standard screws, assembled machines were not less strong, necessarily, than they are today. The screws holding the parts together in most cases cost more originally and replacement was much more diffi-

*Paper presented at N.E.M.A. convention, Hot Springs, Va., June 4, 1927.

cult and expensive. Before we had a standard yard or a standard bushel there was no lack of trading, but it cost much more in time, and consequently in money, to check up on delivery. In the early days of electric motors we simply couldn't tell what we got in the way of value in the general mélange of cost, weight, length of life, efficiency, cost of operation and maintenance, power factor and output of energy.

If there were no standards, it might be more inconvenient for the engineer to fix just what he wanted from the manufacturer, and such inconvenience is a matter of dollars and cents to the man who finally pays the bill.

The charge has often been made that standardizing retards progress by restricting the initiative of inventors and designers. Such a charge could be true only if those in charge of making standards were unwilling to change them as frequently as might be necessary. Such an objection is likely to be found more often in the field of simplified practice than in the field of engineering standards.

On the other hand, it is to be feared that without engineering standards progress might really be retarded in a less obvious way. Both manufacturer and user are unquestionably controlled by enlightened self-interest, but nevertheless the manufacturer is swayed, in some degree at least, by commercial considerations of profit, low cost of manufacture, etc., whereas the purchaser is interested in low purchasing price and maximum results in operation. If there were no intelligent progression of standards under the influence of the engineer, who acts as a medium between the manufacturer and the user, it is conceivable that materials and designs would not be continually changed to give maximum production and lowest cost. They might settle down at an intermediate stage with the possibility of increasing investment by the purchaser for a given amount of service. There would be a tendency on the part of the best manufacturers to play safe and not push the apparatus to its maximum production. On the contrary, the existence of an intelligent fixed standard restrains the purchaser from demanding more than is possible at the time and acts to stay an impossible guarantee by a too liberal manufacturer.

Users of Standards Should Pay All Costs

Well, then, doesn't it follow that if all the benefit of standards accrues to the buyer and seller—that is, the manufacturer and user—they should pay all the costs? In the last analysis, of course, they always have paid it. Engineers often talk of "giving" their time gratis to such work as standard making, but this is only a way of speaking. The salaried engineers who participate in this work are contributed by their employers. The unattached engineers may seem to contribute, but they must receive enough from their employers in their "paid for" hours to enable them to do it. Both types may contribute overtime, but in the long run it is a question as to who finally pays for this.

We might stop here to note that "standards" may have a variety of meanings. A standard screw thread not only makes an attempt to get the maximum strength and service from a given amount of material but also it makes for simplified practice by eliminating unnecessary varieties. The same two ideas are included in standard wire gages, standard pipe flanges and other commodities. There are numerous standards in which practically no engineering or technical treatment are involved. Standard size catalogs are almost wholly unified practice, to reduce the variety of sizes and prevent waste of paper by uneconomical cutting. The same is true of buckets, hinges, candles, shoes and numerous other things.

Now, by what kind of human organization should engineering or technical standards be made? We can note that the making of such standards was started by professional engineers. In most cases this was done before commercial industry saw any need for them, much less demanded them. We may pause for a sentence or two to wonder why this happened. Mark you, I said "professional engineers." What is a professional man, and how does he differ from a skilled workman or a man of commerce? What is a "profession" to which a group of men belong? The professional man, whether he be doctor, lawyer, minister or engineer, and also the merchant and industrial leader, must in every case be a more or less skilled mechanic. Each one owes it to himself and to the community to do the job of his hands, brain, voice and pen to the very best of his ability. But the professional man in surveying his activities sees the need and duty of doing well more than the mere task in hand. He feels a responsibility to make life easier and more effective, to reduce friction, to accomplish more with less effort, to increase equity and fair dealing and to make it easier to attain them.

Business a Profession

It is this higher motive of a professional man that causes us latterly to speak of business as a profession instead of mere trading, and admit that a business man may be a professional man as well. It was this professional sense and feeling that drove professional engineers to make standards before they were apparently needed or demanded by industry. It was because of this moral impetus that, instead of dropping their tools at quitting time and going off to loaf or play, they put in many spare hours at the task. It was because of this special conscience that engineering societies paid a part of the expense of such work out of the dues received from members. I know that such activity broadened the minds and vision of professional men and was at times enjoyable, but nevertheless industry and commerce obtained a valuable benefit.

There should be no misunderstanding of the term "professional engineer." There is certainly no intent to include only the so-called independent consulting engineer, who frequently is not as independent as he seems. No engineer can deny his relationships, but like the lawyer, sometimes he is an advocate, even contrary to his own opinion. At such a time any engineer ceases to be professional in the highest sense. There is nothing derogatory or reproachable about this. In standardization work, however, the source of his appointment is of importance. An engineer, with definite relationships but appointed by his professional society, is appointed for his special knowledge as well as his professional standing. He may be expected, more positively, to act as a professional engineer in his own right while serving under such an appointment. He is supported by the source of his appointment. He is acting here precisely as he acts in the intimate counsels of his company.

Perhaps one may pause again, before saying who shall make standards, to acknowledge who is to accept them. Again note that when an engineer uses a standard he

does so only as an expert adviser to a manufacturer and a user. The standards, to be of any value whatever, must be capable of use in industry and commerce, and therefore only those who are to use them can determine their usability and accept them. Just as a professional engineer, whether working in his private office or as an employee of a corporation, may be ordered to design a power plant, a bridge or a machine, and must finally offer his designs for approval and acceptance to those who are to operate or use them for profit, so the professional engineer, after making a standard, has no part in accepting it. He may, of course, set forth its intrinsic value, point out its availability and urge its use. Beyond this he can do no more than lay it in the lap of the manufacturer and user.

Just because they must be laid in two laps for acceptance indicates a most important advantage in leaving the leadership in their making to the professional engineer. The interests of the manufacturer and user are really identical, but frequently the two must be brought to the same point of view. If the wisest commercial men of these two groups made their own independent standards, they would frequently have marked differences and would need harmonizing. It is just here that the professional engineer would be the fairest and most available adjuster.

It would seem more logical and efficient to let the professional engineer, acting in conference with his fellows of various relationships, so that the needs of all parties who are to accept the standards will be thoroughly known and understood, make the standards mutually. There is hardly a question that these are the conditions that have controlled the standardization work of the A.I.E.E. committee for years and are responsible for the fact that the A.I.E.E. standards are about universally used in specifications and contracts today.

Existing Standard Machinery

What about existing machinery? The panorama is striking and startling in its extent and multiplicity. According to the current issue of a prominent electrical journal, there are altogether about 465 standardizing agencies that have been discovered, and no one knows how many more a complete list would contain. Numbers of these are agencies of long and successful experience. It is not surprising that, following professional instincts, the American Institute of Electrical Engineers was the first in the electrical field. In addition to organizing and carrying on electrical standardization in America, it organized the International Electrotechnical Commission about twenty years ago. With the tremendous extension of electrical manufacturing, numerous trade organizations have taken up standardization, so that the number of interest-conscious agencies is very striking. Unquestionably there is much duplication of effort, much waste of energy, and because of general dissatisfaction and argument over procedure, standardization has not received the financial support which it needs.

To bring some order out of the confusion, the American Engineering Standards Committee was organized a few years ago, first among professional engineering societies and later by the inclusion of all who were interested. It was not to make standards, but to provide a means by which a standard offered by any group could be labeled "national." This meant a review, by an all-inclusive representative group, of any standard offered by a single agency. There was no idea of reducing the number of standard-making agencies, even within a given field. The enormous and wasteful duplication of effort was not eliminated. Those within the field of the standard were to be harmonized among themselves and with any other interested parties outside. No need here to review the details of its organization or procedure.

The harmonizing has been found to be an irritating, time-consuming procedure, and in some cases seems endless. The procedure has not been successful in establishing mutual confidence among the various interests and classes of interests involved. The picture frequently presented to executives has been squabbling, slow progress and almost futility.

It is fair to acknowledge, however, in spite of this dissension and difference, that the American Engineering Standards Committee has been as successful as any agency could have been under the circumstances, and it can grow in strength. I believe the obstacles to its greater success lie not so much in the idea as in its organization. I believe it is here to stay, because it is based on a basically right conception. We must simply carry the idea farther, amend the organization and then support it.

The International Situation

Of late there has been much discussion of international standardization. Experience with several international associations, and particularly for twenty years with the International Electrotechnical Commission, has shown that it will be many a year before we shall have any international standards outside of units of measurement, definitions of technical terms and methods of testing. There will, however, be an increasing international discussion of national standards. This discussion will go far toward reducing differences in various national standards to a small minimum or even to making them identical. Each clarification will be of the greatest aid to American manufacturers who sell abroad and must understand foreign standards to compete successfully for foreign business. These discussions will occur in various committees, international associations, congresses, conventions and the like. Delegates and representatives to these must be carefully chosen. Their proceedings must be capable of clear interpretation here. In addition, therefore, to standardizations proper, there are a multitude of relationships that must be maintained and fostered. This is a different sort of activity from the making of standards at home. The men, usually younger, who make the national technical standards should unquestionably continue their work into the international field, but they could be supported and aided very well by others of greater age and prestige and perhaps of greater diplomatic skill in negotiation. I believe the attempt now in progress to have an "international technical committee" in the United States, organized separately from the A.E.S.C. but the two organizations articulated so intimately that they can act integrally, is the most hopeful plan on which we can step forth to meet our friends abroad. With it we shall be able to protect our own interests adequately and serve the general interests of world progress.

This international technical committee should evolve out of the present national committee of the International Electrotechnical Commission. There are numerous assets of long-established relationships abroad to

be preserved. There are well-tried methods of procedure to be retained. There is some value in a tradition of twenty years' growth. The reorganization would in reality be a new organization with new and equal jurisdictions, voting powers and responsibilities.

Mr. Hoover recently suggested that standards were valuable only so far as manufacturers and users would accept and adopt them. This simple fact needed to be stated by some one like him in order to have it strike home. He is also reported to believe that the national standardization effort, which includes simplified practice, should proceed under the direction of a highest type, properly rewarded executive and staff. This idea is now supported and urged by a leading trade journal, and nothing could be better. In spite of the eminent source of the suggestion, a long term of education for producers and users will be necessary and the sooner an intensive campaign is on the better. In the meantime we can do much to improve existing machinery, especially as I believe it is bound to become a section of the larger plan.

Strengthen Authority of A.E.S.C.

We may acknowledge freely that for engineering standards the United States must have an American Engineering Standards Committee. We must understand that it cannot be made perfect in its constitution or in its operation in a year and a day. No man or group of men is wise enough to put it in shape quickly. It can finally arrive only after a long period of evolution. There is one change, however, that should be made at once. The chief executive officer should be a permanent executive of the highest grade and paid in proportion. It is folly to think that proper results can be obtained by asking one big manufacturing company after another to contribute gratis one of its staff for a term of two years. This is a business proposition and should be handled as one. Volunteer members of committees are excellent for such work and it would be wrong, if not impossible, to have it otherwise. But a volunteer or contributed executive and staff for such a tremendously important activity is futile. Standardization work in America is far beyond such a condition. Given a director of the A.E.S.C., picked because of his unusual qualifications, paid a salary that will make it unlikely that he can be easily lifted out of the job, installed with the knowledge that he is there permanently and expected to grow in knowledge and power year after year, and you can expect results commensurate with the importance of standardization to the producers and users of the United States.

Then I would give him an active board of advisers made up of principal executives. Standardization will never come into its own until the chief executives consider it a matter of vital interest and give it their time and attention. They would advise with him perhaps four times a year on his general problem of making sure that work of the committee was adequately useful to industry. They would have no more to do with making or approving a standard than a director of a utility company has with operating a substation. They would pass on his budget and get him the funds to cover it. This board could be a large one, so as to include a sufficient variety of large and small interests. Sooner or later such an executive would also be the administrator of the international technical committee.

The money for standardization would come from industry, both buyers and sellers, to which the standards would be useful. The chairman and his board would decide a means of assessing the funds equitably, either among the individual companies or among the business associations. The national engineering associations would not be expected to contribute any portion of the dues of their members. In the early days such spending by the engineering societies was proper and reasonable and arose out of the professional spirit of the members. Standardization is now a business proposition far beyond such puny support.

The manufacturer would do well to keep in mind more generally that he and the buying public, in the long run, must accept a standard jointly and that neither can flout the other. Both would do well to keep their engineers who work at standards in the professional (not theoretical) frame of mind, even to the extent of having their appointment come through the national engineering societies.

It is clearly understood who it is the standards have to suit and who is to accept them. The professionals know this. They know that they are in the position that the engineer always is—that of offering plans, designs or reports for acceptance. Just as the engineer is retained to design and build a power plant which, before it is started, must be approved by the owner, so the professional engineering societies might be retained by the manufacturers and users to design and build the standards, which are, however, to be finally approved or accepted by those for whom they are made and who are to be commercially benefited.

Conclusions

Let us sum up the whole matter. Orderly and effective making and acceptance of standards for industry are vital parts of the serious effort America must continuously put forth to maintain her commercial preeminence. From now on competition from abroad is bound to be extremely keen. In America the margin of profit is constantly shrinking and can never be as generous as it has been in the past. The scale of living in America will not be lowered much—it is more likely to increase—which means that labor costs will not yield enough to help. The American manufacturers will do well under such conditions to turn to thrift and elimination of waste in order to maintain prosperity.

Simplified practice, resulting in only the necessary labor and material being put into a given product, and the elimination of all unnecessary varieties must be introduced to the extreme. Standards must be established that will spur the manufacturer to offer the greatest economic value, balancing output and cost, with the minimum expenditure of labor and material. Overhead carrying costs for inventories and stocks must be reduced. All this can be the result of standardization in general, and it is of basic business and financial importance to every industrial management. It is not a technical or theoretical matter to be left entirely to engineers. It is a business-producing, business-holding feature. It cannot take its proper place, receive adequate support and produce its potential results until the principal executives show their practical and abiding interest in it by raising it to the plane of other great departments of business and give it their continuous and critical attention. The commercial progress of America is at stake. We have the organization, the men and the money. Why not proceed at once?

Big Business Has Nothing to Fear

DAVID F. HOUSTON

APPARENTLY always in this country business, in its relation to government, has functioned in an atmosphere of doubt and apprehension, if not of fear. On every hand we meet with a pessimist and a prophet of trouble. As Congress assembles or an election approaches, a shiver runs through the business world. The indication is that Congress and the executive bodies cannot be trusted, that they are menaces; that they have in their membership too many cheap demagogues, and that the people themselves are no longer—if they ever were—capable of supporting just institutions and securing sound courses of action; i.e., that our democracy has failed or is about to fail. No such thing has happened, and the pessimists have been confounded since the days of George Washington. With this as a preface to his address before the N.E.L.A. convention at Atlantic City on June 8 the Hon. David F. Houston continued:

"The big corporation, which formerly was regarded as menacing to the masses, has become the channel through which the small investor has been furnished an easier opportunity to become a capitalist. Education belongs to the people. I admit that we are materialistic. I am proud of it. I have not the contempt for things which some people seem to profess. 'Things' to me mean character, honesty, effort, self-denial and sacrifice. They are steppingstones on which men rise to higher things.

"I have not observed anywhere in history that the higher things of life are found among people who are in the mire, spending the greater part of each day keeping body and soul together and wild beasts from the door.

"If our government cannot be trusted, where will we turn to find a better one? Where a more stable one? Where one which furnishes more guarantees for legal enterprises or property or human rights? No other nation has advanced so far as ours in its social and economic adjustments. In no other can you find political institutions resting upon as broad economic and social foundations, or a population with a higher sense of justice or with so many useful habits of thought.

"Big business is now in an era of calm waters. The fog of suspicion has in part blown away. A greater feeling of confidence on the part of the public and the government toward business has developed. Big business is no longer feared merely because it is big. Only businesses which are badly managed or which indulge in questionable practices are under suspicion. Big business will become bigger. That of today will be a pigmy compared with that of tomorrow. Imagination can only with difficulty picture this nation and big business fifty years from now.

"It is in the power of business to determine, in large measure, the extent and character of government interference. Our government, if it follows precedent, will seek only to abate abuses.

"Business efficiently and legitimately managed has nothing to fear. It must, itself, maintain a clean house. Big enterprises are becoming more and more democratized. The money of the people is more and more being needed and secured. The growing sense of trusteeship must be more highly developed. Businesses must be frank with their owners. They must be frank with their consumers. Their dealings must be fair and aboveboard.

"A utility is entitled to and will seek reasonable rates. It must have a fair return on the fair value of its property. It must maintain a sound financial structure. It must pay fair wages and treat its employees decently. It must employ methods above reproach. It must, of course, give good service. Its management must be efficient and it must ceaselessly seek to effect economies and improvements through scientific research and invention. If it does these things, then it is entitled to the profits it can earn and should be criticised if it does not make profits. It can pile them high and no responsible person will seek to hinder or to obstruct it.

"But I go further and say that if a utility has reached the point where, with reasonable rates, it is earning a fair return, where its financial structure is strong and sound, where it can meet all its fixed charges, pay fair wages, give its owners reasonable dividends and furnish good service, it may regard it as sound business and the highest wisdom to let additional benefits arising from efficient operation and research accrue to the public.

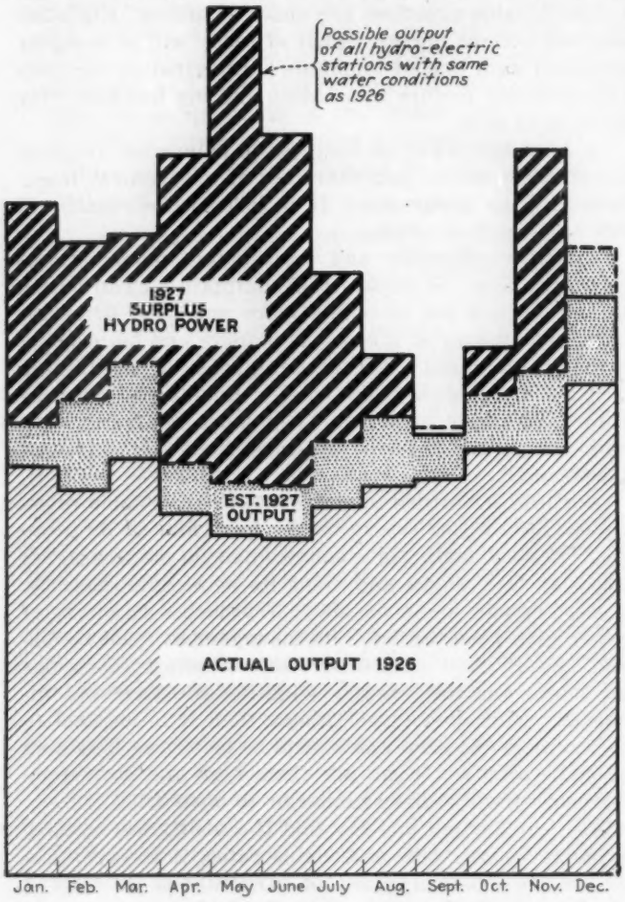
"So conducted, any business may face the future in this country with supreme confidence. Its position will be impregnable against the assaults of the dreamer and the demagogues."

Gulf Island Plant Financing

THE Gulf Island hydro-electric development of the Central Maine Power Company was begun in October, 1925, and placed in service in October, 1926. This development has a total rating of 27,000 hp., and it was completed two months ahead of time at a total cost of about $4,600,000, or $400,000 less than the estimate. The development includes a concrete dam 2,700 ft. long and 50 ft. high, which backs up the waters of the Androscoggin River nine miles and pro-

vides a useful storage capacity of 1,000,000,000 cu.ft. Three 9,000-hp. units were installed, the development being made complete instead of along the usual piecemeal lines. In an average year this station will produce 90,000,000 kw.-hr., or more than half the total output of the company's 22 other stations combined. In the month before Gulf Island began operation 24,438 bbl. of fuel oil was burned in the State of Maine, and in the two following months this consumption fell to 3,371 and 3,498 bbl., the major savings being obtained by reduction of steam plant operation at Farmingdale, Lewiston and Portland through interconnection with Gulf Island.

The financing of this development would have been a serious matter for the Central Maine Power Company


Possible output of all hydro-electric stations with same water conditions as 1926
1927 SURPLUS HYDRO POWER
EST. 1927 OUTPUT
ACTUAL OUTPUT 1926
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

LOAD AND HYDRO-ELECTRIC OUTPUT, CENTRAL MAINE POWER COMPANY SYSTEM

without the credit of the New England Public Service Company and Middle West Utilities Company behind it. The fixed charges on the Gulf Island plant, figured at $360,000 per year, exceeded the net income of the Central Maine company after interest and preferred stock dividends, and it is practically certain that the company would not have undertaken the development at the time it did had there been no holding company behind it. The credit of the Insull organization warranted going ahead with the work, with the result that the entire central and southern part of Maine are benefiting. The plant was built by the Central Maine Power Company, with the benefit of engineering check-up of designs by the Middle West organization, an expeditious proceeding that was of considerable advantage to the Central Maine company. The saving in first cost means that when the plant is fully loaded, each kilowatt-hour produced by it will cost half a mill less than estimated.

Letters from Our Readers

Report of Industry Conference on Wiring

To the Editor of the ELECTRICAL WORLD:

Many will agree with me when I say that not only may the report of the industry conference on wiring be rightly termed epochal as regards the relationships existing in what should rightly be considered an integral community service, but that it calls for the putting forth of a well-considered and sustained effort on the part of every component part of the whole electrical industry so that its recommendation may be pushed home to a logical and successful conclusion.

With regard to the allegation that ill-considered and excessive legislation has been put through in certain centers calling for compulsory use of metal-inclosed wiring it may be remarked that if the right kind of man is at the head of an inspection department he is not likely to be stampeded by interested factions.

As to whether or not insurance rates favor an all-rigid conduit job, it would appear worth while for the Association of Electragists to ascertain definitely the facts in each local jurisdiction. Canadian underwriters grant a concession of 2 cents per hundred on frame buildings entirely wired in rigid conduit and a lesser concession if that style of work is installed in other classes of structures. Such concessions, if available, should be stressed by the A.E.I. and architects should be posted on the question. I am afraid, however, many of the latter, and even some contractors, seem to lead the public to believe that all-metal wired jobs are equal, which is very far indeed from being true.

Referring to a suggestion that service entrance requirements are, as it were, "supercode," I would say that while undoubtedly the cost of this portion of an installation is a good deal higher than it was, say, ten years ago, and while central-station companies have benefited thereby, it is far from the fact to infer that these are the only interests benefited—the chief beneficiary is the owner of the installation. Moreover, if a municipal inspector is alive to his obligations, he will not tolerate, for instance, an indefinite number of aërial services to a building; nor can he fail to stress adequate grounding of the low-tension neutrals.

The real crux of the report, however, centers on the question of house wiring. "What Is Restraining House Wiring?" is one of its headings. Well, that progressive leader in central-station development, Samuel Insull, gave the true answer in his address at the N.E.L.A. meeting in Atlantic City in May, 1926, and I suggest that the ELECTRICAL WORLD could, with great profit to the entire industry, repeat the insert it printed on page 863 of its isue of April 23 last, in which Mr. Insull's views on the subject are set forth, once every month for a year, or until Mr. Insull's vital idea takes a real hold of the imagination of central-station executives generally. On the question of residence rates too many of these, while, no doubt, having some "vision" of the possibilities of this class of business, might find a counterpart in Dr. Watts' lines:

> But timorous mortals start and shrink
> To cross this narrow sea,
> And linger shivering on the brink,
> And fear to launch away.

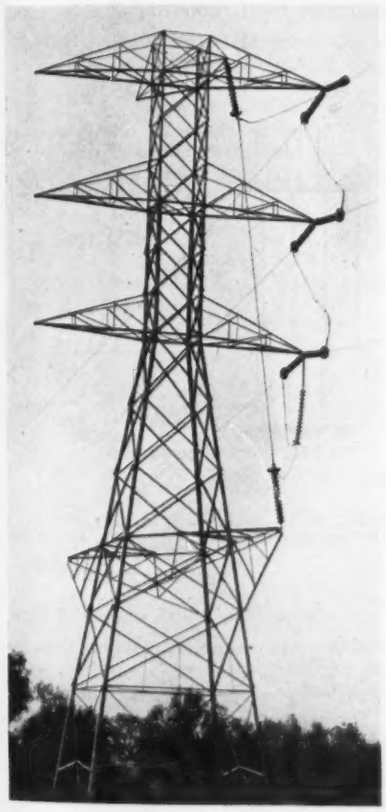
F. A. CAMBRIDGE,
City Electrician.

Winnipeg, Manitoba, Canada.

Central Station and Industrial Practice

One-Tower Transposition for 220-Kv. Line

A TYPE of transposition tower designed primarily for 220,000-volt circuits which permits making the entire transposition on one tower was used by the Great Western Power Company on its recently completed Sacramento - Merced (Cal.) 220-kv. tie line. As illustrated, the top conductor is carried almost vertically down the tower by a long jumper and leaves the tower in the lower conductor position. The center conductor is carried to the top conductor position and the lower conductor to the center position by shorter jumpers stiffened with pieces of ¾-in. galvanized pipe, as shown.



ENTIRE TRANSPOSITION OF 220-KV. LINE MADE ON ONE TOWER AIDS COMMUNICATION CIRCUIT BALANCING

The tower is of a heavy type with long arms and a special bracket for supporting the long jumper. The arms project 18 ft. from the center line of the tower and the bracket extends out a distance of 27 ft. from tower center. The bracket is set at an angle of 15 deg. with the longitudinal axis of the line and the whole transposition scheme is designed to give a minimum spacing between conductors of 14 ft. and 7 ft. clearance to ground, which is ample for 220-kv. operation. The accompanying illustration shows only one circuit in place. A bracket on the opposite side of the tower was provided for transposing the second line when strung.

This method of transposing on one tower was adopted largely to assist communication interests in balancing their circuits, as it effects a transposition of the power line at a definite and exact point instead of spreading it out over three spans as is usually done. It has the further possible advantage that only one special tower is required, whereas three towers, special in some respect, are necessary with the running transposition method. In the 102 miles of lines there are eighteen barrels with transpositions effected every six miles.

Design and construction of the line were under the direction of J. A. Koontz, electrical engineer for the Great Western Power Company.

Need of Accuracy in Dielectric Measurements

BY C. C. KASSON
Superintendent of Standardizing and Testing Department, Edison Electric Illuminating Company of Boston

CONCLUSIONS in regard to cable insulation are often drawn from leakage current measurements during direct-current high-voltage tests and from watt input or dielectric loss tests under alternating-current high-voltage stresses. The value of such conclusions depends upon the accuracy with which these quantities are determined.

The required accuracy is not a question of tenths of per cent, but it is reasonable to expect an accuracy of ± 10 per cent. It is very difficult to obtain this degree of accuracy in either leakage current measurements in insulation under direct-current stress or in dielectric loss measurements under alternating-current stresses.

The difficulty is due mainly to two causes: first, rectified leakages and charging currents in the test sets themselves, and second, leakage of current and power through the air around the insulation. The measuring errors due to these causes range from 10 to 1,000 per cent or more.

Alternating-current 60-cycle measurements on a given cable may show, for instance, a current of 15 amp. and watt input of 5,000 at 30,000 volts. A change of 1 per cent, which amounts to 0.15 amp. or 50 watts, is wholly negligible in analyzing these figures.

However, if the cable were tested at 72,000 volts direct current, the true current and watt readings might be only 0.000015 and 1.3 respectively. A change of the 1 per cent as before amounts to only 0.00000015 and 0.013 watt. Assuming a needed accuracy of ± 10 per cent, it will be necessary to read to 0.0000015 amp. and 0.13 watt, respectively.

It is extremely difficult to measure the high-tension direct current leakage current through the insulation of an installed cable with any accuracy. Observations and deductions on cable insulation characteristics and tendency to failure drawn therefrom are thus of little value and even misleading unless the test work has been done with great care. The error in measuring the leakage current through air at the ends of a very long cable under direct current stress may not amount to more than 10 per cent, but if the cable were 10 ft. long the error might be 10,000 per cent or more. Through the use of proper shields* it is possible to obtain, in the laboratory, true curves of leakage current, insulation resistance and watt input versus direct current voltage stress on short cables.

Dielectric loss tests on short samples of cable under alternating current voltage stress involve meas-

*Described in article by the author in the ELECTRICAL WORLD of Dec. 18, 1926.

urements of watt input the value of which may be of the magnitude of ½ watt. It is quite possible to have ½ watt loss in the air around the ends of the cable insulation. The usual measurements would indicate 1 watt and thus be 100 per cent in error. This can be obviated by shielding the cable insulation itself as well as all instruments and connecting leads.

By the use of shields it is also possible to obtain, at a given frequency, true curves of current, impedance and watt input versus alternating current voltage stress on short cables. The effect of the shield is not so pronounced in the case of alternating-current measurements as with direct current stresses.

Shields are necessary in making both alternating current and direct current measurements on short samples or reel lengths of cable. Shielded measurements provide a new means of obtaining the true electrical characteristics of insulation.

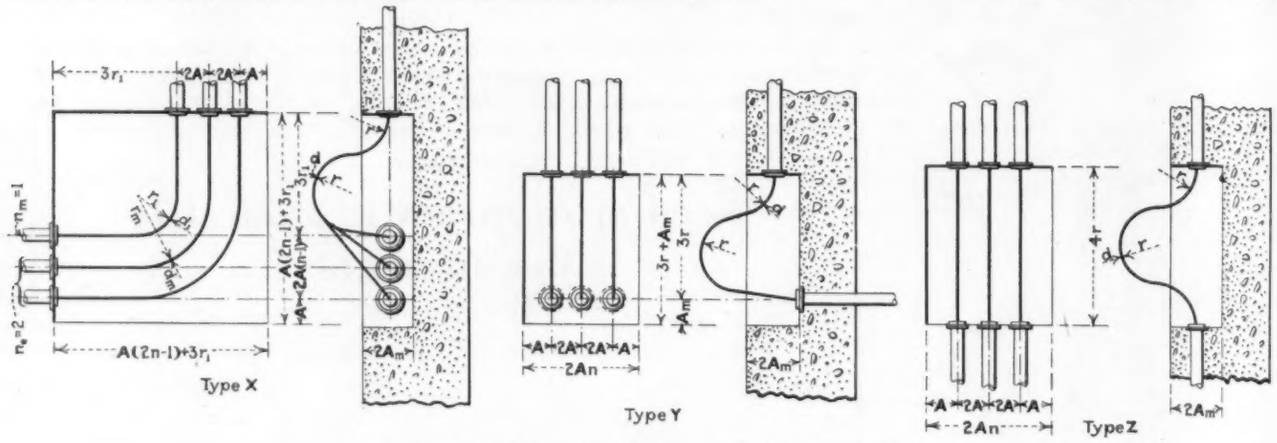
Dielectric action can be studied through the determination of insulation resistance or impedance and the watt input or dielectric loss at various temperature and voltages. In order to obtain true characteristics, however, it is necessary to make accurate measurements.

Rapid Design of Conduit Pull Boxes

BY MAX KUSHLAN
Drafting Division, Stone & Webster, Inc., Boston, Mass.

IN THE design of conduit pull boxes the computation of their minimum internal dimensions is a somewhat laborious task. These dimensions depend largely on the minimum requirements for pulling the conductors and for the proper spacing of the conduits.

To shorten this work and to standardize the assumptions for minimum requirements, the method



FACTORS DETERMINING MINIMUM SIZE OF PULL BOXES

Type X—Conductors turning 90 deg. and parallel to cover; Type Y—Conductors turning 90 deg. in plane perpendicular to cover; Type Z—Through conductors parallel to cover.

Type X:

n = number of conduits passing through box.

$A = \frac{D + C}{2}$ = ½ locknut spacing for average conduit.

A_m = ½ locknut spacing for largest conduit.

r_1 = minimum bending radius of inner wire.

For conduits of several sizes having values A_1, A_2, A_3 etc., $A(2n - 1) = A_1(2n_1 - 1) + 2(A_2n_2 + A_3n_3 + \ldots)$.

Let r_m = minimum bending radius of largest wire.

If $3r_m < 3r_1 + 2An_m$.

Then height = width = $A(2n_s - 1) + 3r_m$.

Type Y:

n = number of conduits passing through box.

r = minimum bending radius of largest wire.

$A = \frac{D + C}{2}$ = ½ locknut spacing for average conduit.

A_m = ½ locknut spacing for largest conduit.

For conduits of several sizes having values A_1, A_2, A_3 etc., $2An = 2(A_1n_1 + A_2n_2 + A_3n_3 + \ldots)$.

Type Z:

n = number of conduits passing through box.

r = minimum bending radius of largest wire.

$A = \frac{D + C}{2}$ = ½ locknut spacing for average conduit.

A_m = ½ locknut spacing for largest conduit.

For conduits of several sizes having values, A_1, A_2, A_3, etc., $2An = 2(2A_1n_1 + A_2n_2 + A_3n_3 + \ldots)$.

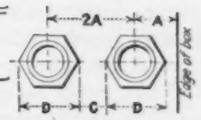
TABLE I—BENDING RADII OF WIRES AND CABLES (INCHES), BRAIDED, LEAD COVERED AND ARMORED

Outside Diam.	Rubber Insulated			Cambric Insulated			Paper Insulated			Outside Diam.	Rubber Insulated			Cambric Insulated			Paper Insulated		
d	r	$3r$	$4r$	r	$3r$	$4r$	r	$3r$	$4r$	d	r	$3r$	$4r$	r	$3r$	$4r$	r	$4r$	$4r$
0.10	0.10	0.30	0.40	0.60	1.80	2.40	0.75	2.25	3.00	1.60	8.00	24.00	32.00	9.60	28.80	38.40	12.00	36.00	48.00
0.20	0.40	1.20	1.60	1.20	3.60	4.80	1.50	4.50	6.00	1.70	8.50	25.50	34.00	10.20	30.60	40.80	12.75	38.25	51.00
0.30	0.90	2.70	3.60	1.80	5.40	7.20	2.25	6.75	9.00	1.80	9.00	27.00	36.00	10.80	32.40	43.20	13.50	40.50	54.00
0.40	1.60	4.80	6.40	2.40	7.20	9.60	3.00	9.00	12.00	1.90	9.50	28.50	38.00	11.40	34.20	45.60	14.25	42.75	57.00
0.50	2.50	7.50	10.00	3.00	9.00	12.00	3.75	11.25	15.00	2.00	10.00	30.00	40.00	12.00	36.00	48.00	15.00	45.00	60.00
0.60	3.00	9.00	12.00	3.60	10.80	14.40	4.50	13.50	18.00	2.10	10.50	31.50	42.00	12.60	37.80	50.40	15.75	47.25	63.00
0.70	3.50	10.50	14.00	4.20	12.60	16.80	5.25	15.75	21.00	2.20	11.00	33.00	44.00	13.20	39.60	52.80	16.50	49.50	66.00
0.80	4.00	12.00	16.00	4.80	14.40	19.20	6.00	18.00	24.00	2.30	11.50	34.50	46.00	13.80	41.40	55.20	17.25	51.75	69.00
0.90	4.50	13.50	18.00	5.40	16.20	21.60	6.75	20.25	27.00	2.40	12.00	36.00	48.00	14.40	43.20	57.60	18.00	54.00	72.00
1.00	5.00	15.00	20.00	6.00	18.00	24.00	7.50	22.50	30.00	2.50	12.50	37.50	50.00	15.00	45.00	60.00	18.75	56.25	75.00
1.10	5.50	16.50	22.00	6.60	19.80	26.40	8.25	24.75	33.00	2.60	13.00	39.00	52.00	15.60	46.80	62.40	19.50	58.50	78.00
1.20	6.00	18.00	24.00	7.20	21.60	28.80	9.00	27.00	36.00	2.70	13.50	40.50	54.00	16.20	48.60	64.80	20.25	60.75	81.00
1.30	6.50	19.50	26.00	7.80	23.40	31.20	9.75	29.25	39.00	2.80	14.00	42.00	56.00	16.80	50.40	67.20	21.00	63.00	84.00
1.40	7.00	21.00	28.00	8.40	25.20	33.60	10.50	31.50	42.00	2.90	14.50	43.50	58.00	17.40	52.20	69.60	21.75	65.25	87.00
1.50	7.50	22.50	30.00	9.00	27.00	36.00	11.25	33.75	45.00	3.00	15.00	45.00	60.00	18.00	54.00	72.00	22.50	67.50	90.00

Interpolation Table—Differences

Outside Diam. d	0.50	1.50	2.00	0.60	1.80	2.40	0.75	2.25	3.00	2.80	3.60	0.30	0.70	0.90	1.20	2.10	2.70
0.01	0.05	0.15	0.20	0.06	0.18	0.24	0.075	0.225	0.30	0.28	0.36	0.03	0.07	0.09	0.12	0.21	0.27
0.02	0.10	0.30	0.40	0.12	0.36	0.48	0.150	0.450	0.60	0.56	0.72	0.06	0.14	0.18	0.24	0.42	0.54
0.03	0.15	0.45	0.60	0.18	0.54	0.72	0.225	0.675	0.90	0.84	1.08	0.09	0.21	0.24	0.36	0.63	0.81
0.04	0.20	0.60	0.80	0.24	0.72	0.96	0.300	0.900	1.20	1.12	1.44	0.12	0.28	0.36	0.48	0.84	1.08
0.05	0.25	0.75	1.00	0.30	0.90	1.20	0.375	1.125	1.50	1.40	1.80	0.15	0.35	0.45	0.60	1.05	1.35
0.06	0.30	0.90	1.20	0.36	1.08	1.44	0.450	1.350	1.80	1.68	2.16	0.18	0.42	0.54	0.72	1.26	1.62
0.07	0.35	1.05	1.40	0.42	1.26	1.68	0.525	1.575	2.10	1.96	2.52	0.21	0.49	0.63	0.84	1.47	1.89
0.08	0.40	1.20	1.60	0.48	1.44	1.92	0.600	1.800	2.40	2.24	2.88	0.24	0.56	0.72	0.96	1.68	2.16
0.09	0.45	1.35	1.80	0.54	1.62	2.16	0.675	2.025	2.70	2.52	3.24	0.27	0.63	0.81	1.08	1.89	2.43

TABLE II—CONDUIT LOCKNUT CLEARANCES
(INCHES)



Conduit Size	Locknut Diam. D	$\frac{D}{2}$ + Clear A	2A	3A	4A	5A	7A	7A	8A	9A	10A	11A	12A	13A	14A	15A
½	1¼	0.750	1.500	2.250	3.000	3.750	4.500	5.250	6.000	6.750	7.500	8.250	9.000	9.750	10.500	11.250
¾	1½	0.875	1.750	2.625	3.500	4.375	5.250	6.125	7.000	7.875	8.750	9.625	10.500	11.375	12.250	13.125
1	1¾	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000
1¼	2⅛	1.250	2.500	3.750	5.000	6.250	7.500	8.750	10.000	11.250	12.500	13.750	15.000	16.250	17.500	18.750
1½	2⅜	1.375	2.750	4.125	5.500	6.875	8.250	9.625	11.000	12.375	13.750	15.125	16.500	17.875	19.250	20.625
2	3⅛	1.750	3.500	5.250	7.000	8.750	10.500	12.250	14.000	15.750	17.500	19.250	21.000	22.750	24.500	26.250
2½	3¾	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000	24.000	26.000	28.000	30.000
3	4⅛	2.375	4.750	7.125	9.500	11.875	14.250	16.625	19.000	21.375	23.750	26.125	28.500	30.875	33.250	35.625
3½	5	2.625	5.250	7.875	10.500	13.125	15.750	18.375	21.000	23.625	26.250	28.875	31.500	34.125	36.750	39.375

shown in the accompanying sketches and tables has been developed.

The use of the formulas and tables may be illustrated by a few typical problems:

Example 1. To determine the minimum internal dimensions of Type X pull box (Fig. 1) with five 2-in. conduits, the inner wire being a rubber-covered No. 2, insulated for 3,500 volts, with an outside diameter $d = 0.76$ in.

Solution. From formula for Type X boxes given in Fig. 1

height = width = $A(2n-1) + 3r_1$.

Since the number of conduits is $n = 5$,

$$A(2n-1) = 9A.$$

In Table II for 2-in. conduits, $9A = 15.75$ in.

In Table I for rubber-covered wire

for $d = 0.70$, $3r_1 = 10.50$,

for $d = 0.80$, $3r_1 = 12.00$,

$$12.00 - 10.50 = 1.50$$

For $d = 0.06$ (0.76 — 0.70) the interpolation is 0.90; then for $d = 0.76$, $3r_1 = 10.50 + 0.90 = 11.40$ in.

Height = width = 15.75 + 11.40 = 27.15 in.

The depth = $2A_m = 3.50$ (Table II).

The minimum practical box dimensions are:

$$27\tfrac{1}{4} \times 27\tfrac{1}{4} \times 4 \text{ in.}$$

Example 2. To find the minimum size of Type Y pull box (Fig. 2) with three 1½-in. conduits and three 2½-in. conduits, the largest conductor having a diameter of 1.28 in., with varnished cambric insulation.

Solution. In Table I for varnished cambric insulation we have:

$3r = 21.60 + 1.44 = 23.04$ in.

For a 2½-in. conduit, $A_m = 2.00$ (Table II).

Height = $3r + A_m = 23.04 + 2.00 = 25.04$ in.

For three 1½-in. conduits, $2An = 6A = 8.250$.

For three 2½-in. conduits, $2An = 6A = 12.000$.

Total width = 8.25 + 12.00 = 20.25 in.

Depth = $2A_m$ for a 2½-in. conduit = 4.00 in.

Minimum size of box is:

$$25\tfrac{1}{4} \times 20\tfrac{1}{4} \times 4 \text{ in.}$$

Example 3. To solve for the minimum size of pull box assuming the same conditions as in Example 2 but for Type Z (Fig. 3).

Solution. The height = $4r = 28.80 + 1.92 = 30.72$ in. (Table I).

The width = 8.25 + 12.00 = 20.25 in. (Table II).

The depth = 4.00 (Table II).

Minimum size of box is:

$$30\tfrac{3}{4} \times 20\tfrac{1}{4} \times 4 \text{ in.}$$

It is evident that the use of these tables and empirical formulas is accurate enough for most purposes.

Grounding Bank Establishes Neutral on Delta System

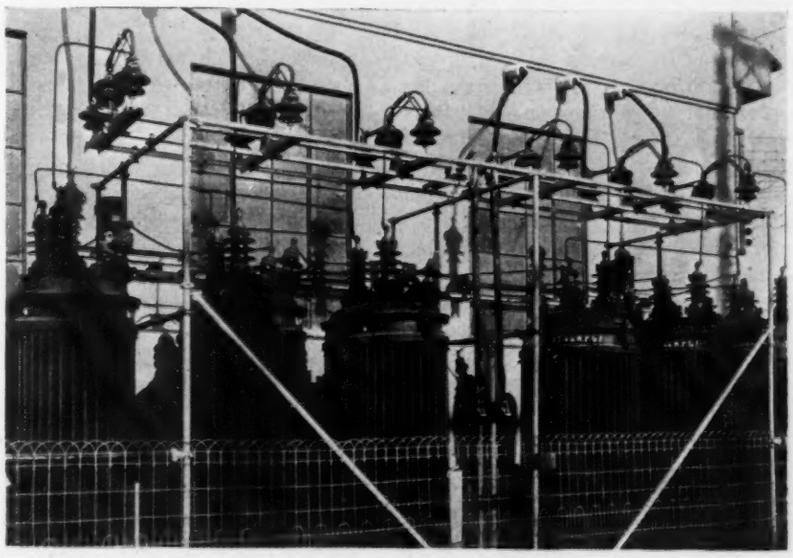
ON ITS 22,000-volt delta system the Great Western Power Company of California makes it a practice to install transformer grounding banks similar to those shown in the accompanying illustration to establish a neutral for the operation of relays. The installation shown is at the Brighton substation at Sacramento, where two banks of three 200-kva. transformers each have been provided for the double bus. A neutral on the 22-kv. system is established by grounding the neutral of the Y-connected high-tension windings of the grounding bank. The secondary windings are connected delta with a current transformer placed in one corner of the delta for operation of a ground directional relay.

The size of the grounding bank is determined by the magnitude of ground current possible during faults, and the transformers must be of sufficient capacity to carry this current for the length of time required to operate relays without danger of burning out the transformers. Grounding banks usually are not protected by oil circuit breakers, but are equipped with a three-pole gang-operated disconnecting switch. The gang-operated switch shown is very essential, as the operation of single-pole switches would throw a ground on one leg of the 22-kv. system, causing the operation of relays and possible insulator failures on the 22-kv. system.

Sleet Prevention Methods

PRACTICALLY the only way to prevent sleet from forming on transmission lines is by raising the temperature of the conductors by means of an electric current, according to a serial report issued recently by the N.E.L.A.

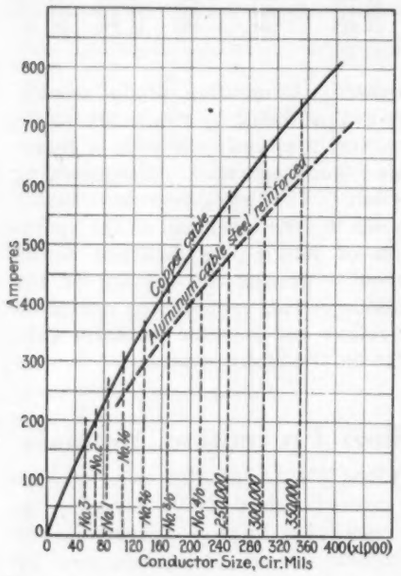
Three methods of obtaining the necessary current have been used where the normal load current was not sufficient: (1) Carrying load over one circuit which could normally be carried by two or more circuits; (2) short circuiting a line at one end and applying a sufficient voltage at the other to cause the proper amount of current to flow; (3) using synchronous condensers or re-



THREE 200-KVA. TRANSFORMERS WITH GANG-OPERATED DISCONNECTING SWITCHES FOR GROUNDING 22-KV. SYSTEMS

serve generating capacities operating as synchronous condensers to increase the current flowing.

The procedure most commonly used by the companies that have applied sleet-preventive methods is a combination of the first two methods outlined. Enough lines are taken out of service to load the remaining



RELATION BETWEEN SIZE OF CONDUCTOR AND CURRENT NECESSARY TO KEEP IT CLEAR OF SLEET AND ICE

lines to the point where ice will not form on them. Where a considerable capacity of synchronous condensers or idle generating capacity is available at the receiving end of a line, this may be used to increase the wattless component of the load current and in that way assist in heating the conductors.

Sleet or ice forms on transmission lines only when the air temperature is very close to 32 deg. F. If the temperature of the conductor can be raised a few degrees above that of the surrounding air, it will prevent the formation of ice on it. Obviously it is much more difficult to melt off a deposit of ice from a conductor after it has formed to an appreciable thickness, especially if the temperature has dropped meanwhile to a point lower than freezing.

The greatest difficulty in applying preventive methods to most systems is that it is necessary to have sources of voltage of various values at several strategic locations on the system in order that just the proper amount of current may be passed over the wires to keep them free from ice. There are usually two possible sources of supply: (1) transformers of a proper ratio connected directly to the station bus, and (2) idle generators or synchronous condensers, which may be connected directly or through transformers to the transmission line. The latter method has the greater flexibility, as it is possible to control a generator's voltage to give just the correct value of current.

Mention is also made of various means of connecting the source of voltage supply for the sleet-melting operations to the line that it is desired to clear. The installations are usually in connection with generating stations or large switching stations where a considerable number of lines are brought together. When duplicate buses are provided, one of these may be used, or a special "sleet bus" may be provided that can be "jumpered" to any line or source of supply. The line may be short circuited by means of air-break switches at substations or by the use of short-circuiting jumpers between lines.

Rural-Line Specifications—IV

Of the Wisconsin Power & Light Company

Crossarms, Crossarm Braces and Bolts

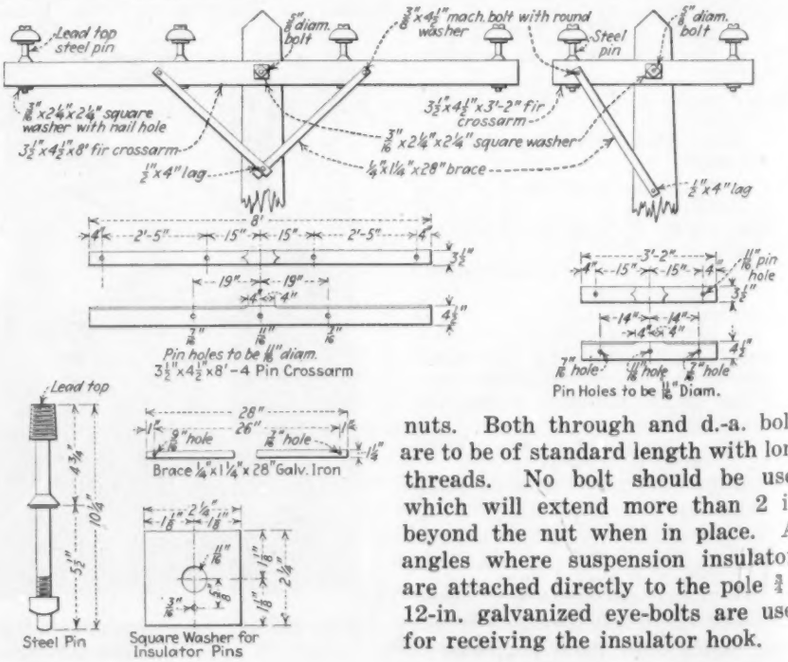
FOR supporting rural line* conductors only two types of crossarms are to be used: 3½-in. x 4½-in. x 8-ft. four-pin, and 3½-in.x 4½-in.x 3-ft. 2-in. two-pin Washington fir arms as shown on the drawing herewith.

The 3½-in.x 4½-in.x 8-ft. four-pin Washington fir crossarm is to be used for all main lines carrying three or four conductors or where this number is to be used ultimately, although only two conductors are installed initially. If only two or three conductors are to be placed on this arm during the initial construction, the other pin holes are to be left vacant until the remaining conductors are required. For permanent single-phase lines a 3½-in. x 4½-in. x 4-ft. two-pin Washington fir crossarm is to be used.

Crossarm Braces and Bolts.—On the four-pin 8-ft. arm, two ¼ x 1¼ x 28-in. flat galvanized braces are to be used, attached to the crossarm by ⅝x4½-in. galvanized machine bolts. Under the head of the bolt (crossarm side) is to be placed a 1-in. diameter fourteen gage round galvanized washer. The braces are to be attached to the pole by a ½ x 4-in. galvanized lag screw. On the two-pin 3-ft. 2-in. crossarm only one of the above braces is to be used.

The bolts for attaching the arms to the pole are ⅝-in. diameter galvanized machine or through bolts. The brace bolts are to be ⅜ x 4½-in. galvanized machine bolts. The double-arming bolts are to be ⅝-in. diameter galvanized d.-a. bolts with four nuts. Both through and d.-a. bolts are to be of standard length with long threads. No bolt should be used which will extend more than 2 in. beyond the nut when in place. At angles where suspension insulators are attached directly to the pole ¾ x 12-in. galvanized eye-bolts are used for receiving the insulator hook.

*For supporting joint rural and telephone lines or joint rural and power lines, special construction may be required. These conditions will be referred to later.



Commercial Activities and Public Relations

Women Prove Their Sales Talent

THE sales ability of women employees of the Central Illinois Public Service Company was clearly demonstrated in a series of three appliance-selling campaigns recently conducted under the direction of the women's committee. One month was devoted to a single appliance, quotas being set in each case.

The waffle-iron campaign held in February resulted in the sale of 730 waffle irons, or 80 per cent more than the quota. During the March campaign 569 toasters were sold, 42 per cent in excess of the quota. In April 428 percolators were sold, which was 7 per cent ahead of the quota. This means a total of 1,727 appliances sold during the 72 working days, or an average of 24 appliances per day.

The successful lamp campaign of last fall, the first to be confined entirely to woman employees and sponsored by the company, was the forerunner of this series of sales efforts. On the strength of the success of the lamp campaign and the enthusiasm and interest manifested in it, the February, March and April small appliance campaigns were placed in the hands of the women's committee. The success of these drives is ascribed to the well-organized groups of woman employees and to the hearty co-operation of the women's committee, which outlined programs for their meetings, offering suggestions for selling, display methods and demonstrations.

Prizes were awarded to those making the greatest number of sales, the prizes being displayed in the various divisions. For each of the appliance campaigns a commission was paid on every sale made by a girl employee. The plan of the work contemplated every woman taking part. Competition was maintained among the different divisions and among the individual girls by the distribution of weekly bulletins. "Pep" bulletins were also prepared and distributed by each division chairman.

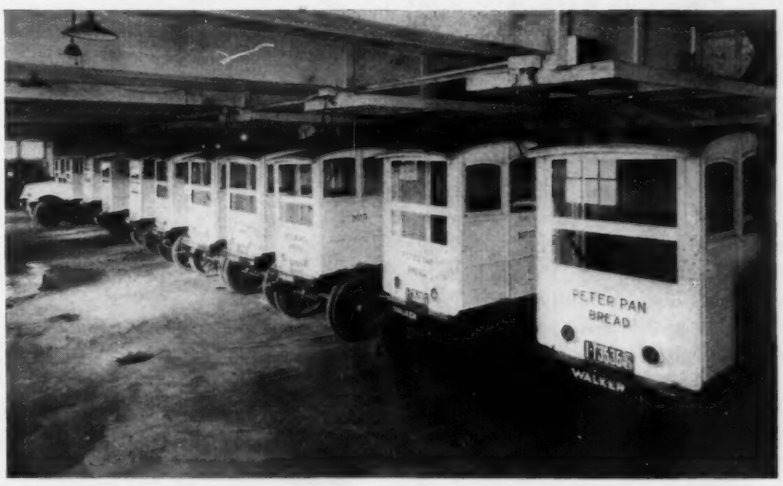
A young lady cashier at Harrisburg won the $25 company prize for each appliance campaign, as well as the prize awarded by her own division. Her total sales were 55 waffle irons in February, 118 toasters in March and 59 percolators in April. The company serves a population of 7,125 at Harrisburg, and most of the cashier's sales were made after office hours by house-to-house canvassing of prospects.

These campaigns have proved conclusively to those who directed them that the company has a latent sales force in its woman employees. It is felt that by enlisting the efforts of the woman employees these small appliances commonly termed "shelf goods" can readily be placed in the homes of the company's customers.

Electric Trucks Save Money for Omaha Bakery

BY FORD BATES
Nebraska Power Company, Omaha, Neb.

ECONOMIES in the operation of electric over gasoline trucks in the distribution of bakery products is illustrated in cost data prepared by the P. F. Petersen Baking Company of Omaha, covering average monthly operating expenses of ten electric and nine gas cars during the months of March, April, May and June, 1926. These delivery trucks serve nineteen different sections of Omaha, Neb. Routes are over streets which, for the most part, are hilly rather than level. As evidence of this fact, the maximum street grade in Omaha is 17 per cent, and the average grade ranges from 7 to 10 per cent.



ELECTRIC TRUCK FLEET OF P. F. PETERSEN BAKING COMPANY, OMAHA, NEB.

Analysis of vehicle maintenance and upkeep costs over these four months shown in the accompanying tables discloses that the electric trucks were 7.1 cents cheaper to operate per mile than the gas type. Total electric operating costs averaged $1,036.29 per month during the period stated earlier, in contrast to $1,659.50 for gas cars, a saving of $622.21. Gasoline, oil and tires usually form the largest single items of expense in the operation of a fleet of gas delivery trucks. The use of electrics in distributing bakery products permitted a saving of $423.40, or more than 600 per cent per month, for these three items alone. In a year this would mean a saving of $5,080.80. Hard rubber tires are used on the electrics, which accounts for the full saving in this item. Contrary to general belief, trucks so equipped do not slow up distribution, according to the experiences in this case. Rather the reverse is true.

Depreciation of the gas cars is

TABLE I—ITEMIZED OPERATING COSTS OF TEN ELECTRIC TRUCKS
(Total Mileage 6,050)

Truck No.	Parts, Labor and Repairs	Unapportioned and Maintenance Labor	Electric Energy	Tires, Tubes and Tire Supplies	Extra Car Costs	Auto Depreciation	Total Costs
1	$9.03	$19.17	$6.85	.....	$32.38	$32.02	$99.45
2	16.93	18.98	6.85	.....	32.38	32.02	107.16
3	11.68	19.82	6.85	.....	32.38	32.02	102.75
4	16.12	19.17	6.85	.....	32.38	32.02	106.54
5	2.09	19.28	6.85	.....	32.38	37.71	98.31
6	16.75	19.17	6.85	.....	32.38	37.71	112.86
7	13.98	20.92	6.85	.....	32.38	32.02	106.15
8	13.70	22.39	6.85	.....	32.38	32.02	107.34
9	2.09	20.35	6.85	.....	32.38	32.02	93.69
10	10.70	20.09	6.85	.....	32.38	32.02	102.04
Totals.....	$113.07	$199.34	$68.50	.....	$323.80	$331.58	$1,036.29
Ave. per car	$11.31	$19.93	$6.85	.....	$32.38	$33.16	$103.63
Ave. per mile.....	$0.0187	$0.0329	$0.0113	.....	$0.0535	$0.0548	$0.1712

TABLE II—ITEMIZED OPERATING COST OF NINE GAS TRUCKS
(Total Mileage, 6,850)

Truck No.	Parts, Labor and Repairs	Unapportioned and Maintenance Labor	Gas and Oil	Tires, Tubes and Tire Supplies	Extra Car Costs	Auto Depreciation	Total Costs
1	$24.21	$38.74	$38.51	$18.30	$39.27	$37.95	$196.98
2	16.97	21.20	36.81	13.98	39.27	37.95	166.18
3	24.25	32.42	39.72	.19	39.27	51.78	187.63
4	5.05	25.40	40.47	.19	39.27	27.30	137.68
5	18.98	34.99	47.60	29.41	39.27	55.25	225.50
6	30.70	50.07	39.19	16.13	39.27	48.65	224.01
7	40.02	39.99	40.39	17.25	39.27	55.25	232.17
8	19.02	32.00	48.31	14.37	39.27	00.00	152.97
9	2.08	21.66	36.04	15.04	39.27	22.29	136.38
Total.....	$181.28	$296.47	$367.04	$124.86	$353.43	$336.42	$1,659.50
Ave. per car..	$20.14	$32.94	$40.78	$13.87	$39.27	$37.38	$184.38
Ave. per mile.....	$0.0265	$0.0433	$0.0536	$0.0182	$0.0516	$0.0491	$0.2423

fixed at four years, compared with ten years for electrics. Battery life, however, is fixed at four years.

A significant feature is brought to light with regard to the number and cost of each unit delivered per month by the two types of vehicles. Whereas the electrics delivered a total of 283,871 cakes and loaves of bread at a cost of 0.365 cent per unit, the gas cars handled 243,331 cakes and loaves at a total cost per unit of 0.682 cent, a saving of 0.317 cent per unit through electric truck delivery.

Cost of Installing a Bank Service

IN CONNECTION with the running of central-station service from an adjacent manhole to a vault built by a bank in a Massachusetts city the following analysis of costs was made after the recent completion of the job. The vault was provided by the property owner, and the power company installed service cables, duct and underground construction with a 25-kva. transformer and switching equipment:

Items	No. of Units	Price Per Unit	Totals
100-amp. cutouts...	4	$21.33	$85.32
150-amp., double-pole, double-throw oil switch	1		72.62
175-amp. potheads..	5	6.95—	34.73
25-kva. transformer, 5-amp. "OA" demand meter	1		7.51
3.5-in. steel pipe....	41 ft.	0.63+	25.89
2,300 to 220/110 volts	1		225.18
200/5-amp. current transformer	1		20.48
3-in. steel pipe.....	84 ft.	0.42+	35.41
Pipe bends.....	9	2.76—	24.80
No. 2, 5,000-volt cable .....375 ft.		0.20—	73.50
Labor			242.93
Insurance			6.34
Storeroom charge...			14.24
Automobile charge..			30.32
Hauling			14.00
Bolts, screws, washers and miscellaneous small items.....			102.78
Total			$1,016.05

After the Electric Range Is Sold

BY MILDRED D. TERMAN
Home Service Department, Duquesne Light Company, Pittsburgh, Pa.

SALE of an electric range should not end with its installation in the customer's kitchen. Actually the test of real selling—that of a satisfied customer—comes after this. The electric range manufacturers say, "Whose work is it after this?" and similar questions are asked by the jobber, the dealer and the public utility. Without attempting to answer the question categorically, it is an obligation that must be assumed by some one, because then and then only will electric ranges give complete satisfaction and begin to sell themselves.

Much attention is given to the housewife at the time of her purchase of an electric range. It is this same housewife, however, so often forgotten after the range is installed, who sells or unsells the idea to other housewives of her acquaintance. The satisfied user is the greatest seller of electric appliances in the home. One woman told the writer not long ago that she had sold a certain make of washer to nineteen of her friends—all because she was so pleased with it. There are many similar cases.

INSTRUCTING THE HOUSEWIFE IN THE OPERATION OF A NEWLY INSTALLED ELECTRIC RANGE

Every housewife after her electric range has been installed should have it thoroughly explained to her; the instruction book should be gone over so that she may be familiar with it for ready reference, and check calls should be made during the first two months. This is essential, because almost every woman has a certain fear of the range. It is an entirely new appliance to her and she is afraid to experiment for fear of spoiling food, "running up her bill" or igno-

rance of operation. When these fears are dispelled and she is able to use it intelligently and is producing "the most wonderful" pies and cakes, then she will begin to tell, with great pride, all about her electric range, and that is when the real work is done.

Because it has been impossible for me to visit personally every woman who has an electric range in our district, a series of letters has been sent to each name on our file of range users. The first two letters gave in the very clearest and simplest of language the care, use and operation of the electric range. Women who have had their ranges more than five years said they had learned new points and had many questions answered in these letters. Every month since I have followed with a monthly bulletin of "good will." These are chats about household problems, articles of interest in the current magazine issues, some points reviewed about the range, and a new recipe or a menu. The women enjoy them very much. Personal calls are made in many cases when possible.

After the sale is completed the same housewife is near by to "check up," and it gives the recently sold customer a feeling of security that she has some one upon whom she may call for help any time she needs it. The housewife who renders the service is given a certain percentage on every sale she makes.

Thus the range user is a salesperson. Every person is sold more things by his friends than he is ever sold by a salesman. How many radios have been sold from the store? Most radios have been sold when a friend invited one to "come over and listen to the radio." And as the guest sat and turned the knobs this way and that way, and felt the thrill of getting music from hundreds of miles away—that's when he was sold a radio, and the man in the store just took the order. It has been the same way with automobiles, electric washers, ironers, refrigerators and everything in the home. So don't forget the housewives; if you treat them right they are your best salesmen.

Utility Employs Expert to Aid Farmers

ALTHOUGH the idea is somewhat new, it is just as logical for a central station to employ a farm expert to aid rural customers in the solution of their problems as it is to engage lighting experts and commercial engineers. For more than a year the Puget Sound Power & Light Company, serving western Washington, has had on its staff a farm expert, who devotes his entire time to aiding the company's 26,000 rural customers in increasing the usefulness of electricity on the farm.

This man knows all phases of farming and is an expert on such matters as irrigation, poultry raising and dairying. Moreover, he has had some technical experience; he is familiar with the uses of electricity on the farm, and has a knowledge of the public utility business. Because he knows the farmer's problems and can talk his language he is in great demand as a speaker before farm gatherings and as a writer for local farm magazines. He works in close co-operation with the western Washington experimental farm operated by the state university and with other agencies and bodies seeking to make farming easier and more profitable through the use of electricity.

One very creditable piece of work that has been done is the issuance of an attractive booklet showing a variety of uses for electricity on the farm. The accompanying illustrations clearly show the manner of presentation and indicate to some extent the scope of the booklet.

HOW TO MAKE MORE MONEY on the Farm
POWER PUGET SOUND LIGHT
Electricity will do for Agriculture what it has done for Industry
Commercial poultry production requires electric apparatus because of the necessity to save time and labor.
LET US HELP YOU!
Puget Sound Power & Light Co.
DISTRICT OFFICES
SEATTLE – EVERETT – WENATCHEE – TACOMA
BELLINGHAM – CHEHALIS – BREMERTON
The farmer's wife is keeping up with her city sister in adopting labor-saving, electrical kitchen appliances
Better Lighting saved 35% in time!

SAMPLE PAGES OF ATTRACTIVE BOOKLET ISSUED BY PUGET SOUND POWER & LIGHT COMPANY TO AID RURAL CUSTOMERS IN THE USE OF ELECTRICITY ON THE FARM

A most satisfactory solution of this educational service is to select for each district an intelligent woman, who has an electric range, to do this work. Nearly every woman likes an outside interest and likes to make some "pin money."

This woman invites her friends into her house to see her range, explains its operation, shows her baked products and her electric bill, and all this has greater influence on the prospective customer coming from a housewife she knows than from some salesman whom she does not know.

New Books

Electrical Condensers: Their Construction, Design and Industrial Uses

By Philip R. Coursey. New York: Sir Isaac Pitman & Sons, Ltd. 634 pages, illustrated.

A very complete treatise on modern condensers has been written by Mr. Coursey. The radio industry gave an impetus to condenser design and construction which has brought about many new types of condensers and much new information about dielectrics and their use. Recent developments have had to do with power-factor correction, condenser couplings for carrier-current communication and surge absorbers for high-voltage lines.

The nature and fundamental properties of condensers, dielectric characteristics, design formulas for condensers, capacity of cables and aërial lines, radio condenser use and design, measurement of capacity and testing of condensers, air, glass, mica, liquid and paper condenser design and characteristics, high-voltage condensers and condenser applications are topics treated in this book. The discussion is comprehensive, yet the descriptive treatment is splendid. The volume should be welcomed by all engineers interested in condenser applications and those who are trying to develop still better condensers.

The Public Utilities: A Retrospect and Forecast to 1930

New York City: Blakemore Analytical Reports, Inc.

This publication contains a concise and illuminating survey of public utility growth from the eighties to the present time, with a forecast of the probable growth to the end of the present decade. It does not contain a complete analysis of 1926 operations and progress, but it may be assumed that revisions are contemplated. One will find here, amply illustrated with tables and charts, an economic, engineering and financial survey of the light and power industry, the street-railway industry, Pacific Coast utilities, superpower, water-power resources, the gas industry, the telephone industry and cognate subjects. There is also a discussion of the motor-bus industry, showing the extent of its competition with street railways.

Altogether, the review is a contribution to utility literature in that it assembles a fund of data taken from various sources. The Blakemore Analytical Reports, Inc., was organized some months ago for the purpose of making studies of the public utility industry and of specific industries for the companies themselves, for investment banking houses, insurance companies and other large investors. The personnel of the Blakemore organization consists of specialists trained in engineering, economics and finance. It has an advisory committee consisting of officials of some of the leading insurance companies, and its list of clients includes the largest investment banking houses in the country. The organization is headed by Maurice N. Blakemore, an engineer of wide experience in various phases of the public utility industry.

Electric Power Transmission

By Alfred Still. Third edition, revised. New York: McGraw-Hill Book Company, Inc. 414 pages, illustrated.

This well-tried text and treatise on overhead and underground transmission has been thoroughly revised and brought up to date. It treats of the essential principles and modern practices pertaining to the electrical and mechanical design and performance of transmission lines. Distribution systems and the stability of systems are not discussed, but protection against lightning, voltage control and insulation problems are treated thoroughly. The calculation of lines under different conditions is outlined, and there is no doubt that the new edition will be used greatly as a textbook and as an engineering reference manual.

Guiding Principles of Public Service Regulation—Volume III

By Henry C. Spurr. Rochester, N. Y.: Public Utilities Reports Inc. 920 pages.

The comprehensive treatment of rates and returns found in this volume will be welcomed by those interested in this aspect of utility activities. The author has done a tremendous amount of labor in assembling commission rulings and court rulings and in digesting the data. His conclusions and statements of principles are clear and accurate and his arrangement of topics is logical.

Chapters of interest are those dealing with return to which utilities are entitled, the fair return, attraction of capital, efficiency in management and service, return during abnormal periods, cost basis of rate making, analysis of costs and expenses, flat and meter rates, minimum charges, service charges, demand charges, large-quantity rates, rate schedules, contract rates, rate making, and a detailed discussion of water, gas, electric, railway and telephone rates. The treatment is semi-legal and is based on legal records. Citations for statements are made in all cases, and this should cause the volume to rank as authoritative. It deserves to be read and used by all interested in utility rates.

The Art of Speculation

By Philip L. Carret. Boston: Published by Barron's.

"The Art of Speculation" deals in a most interesting and instructive manner with the whole field of speculation, and to a degree with the investment field. It discusses in language that the layman can understand the machinery of the security market, the technique of trading, as well as the main factors and movements controlling stock-market fluctuations. The aim is to enable the speculator and the investor to take advantage of long and short market movements with a minimum of risk, avoiding the pitfalls and taking advantage of the most approved trading methods available. The author is not at all complimentary to the small speculator whose operations are more on the basis of gambling than speculating. He is more concerned with the scientific aspects of speculating in a large way when the speculator has a reasonable amount of capital to start.

Special attention is paid to the public utilities in various sections of the book. Much of value is said in the chapter entitled "Rails and Utilities, Victims or Beneficiaries of Regulation?" While this chapter is written primarily from the investor's angle, its value is not limited to the investor, since it deals with certain aspects of financing problems as well.

Properties and Test of Magnetic Materials

By Thomas Spooner. New York: McGraw-Hill Book Company, Inc. 378 pages, illustrated.

Magnetic properties of commercial ferromagnetic materials have afforded a subject for much fruitful research. In this book Mr. Spooner has compiled available knowledge of these properties and has described testing methods which may be used on magnetic materials to determine their fitness for commercial and research uses. Normal magnetic material curves and data are included, and the author gives also good data on the effect of heat treatment, temperature, mechanical working, frequency and other variables to which magnetic materials may be subjected.

The test methods, data and descriptions form a large part of the work. They should be very useful to all men working with magnetic materials, for the author combines the attitude of mind and precision of a research worker with a good practical sense of commercial values. Commercial applications to transformers and machines are covered well, and a good chapter is written about magnetic analysis. Many references to sources of material are given.

Books Received

Old Chemistries. By Edgar F. Smith. New York: McGraw-Hill Book Company, Inc. 89 pages, illustrated. Price, $2.50.

Thermodynamics. By J. E. Emswiller. New York: McGraw-Hill Book Company, Inc. 296 pages, illustrated. Price, $3.

Mathematical Principles of Finance. By Frederick Charles Kent. New York: McGraw-Hill Book Company, Inc. 214 pages, illustrated. Price, $4.

Kinetic Theory of Gases. By Leonard B. Loeb. New York: McGraw-Hill Book Company, Inc. 555 pages, illustrated. Price, $5.50.

A Manual of Automatic Telephony. By Charles W. Wilman. London: Crosby, Lockwood & Son. 223 pages, illustrated. Price, 7s. 6d. net.

Repair Shop Diagrams and Connecting Table for Induction Motors. By Daniel H. Braymer and A. C. Roe. New York: McGraw-Hill Book Company, Inc. 232 pages, illustrated. Price, $2.50.

Thirty-Ninth Report of the Railroad and Warehouse Commission of the State of Minnesota. Minneapolis, Minn.: Syndicate Printing Company. 864 pages, illustrated.

The Engineering Index, 1926. New York: The American Society of Mechanical Engineers. 809 pages.

Methoden der Angewandten Geophysik. By Dr. Richard Ambronn. Dresden and Leipzig: Theodor Steinkopff. 258 pages, 84 illustrations.

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

Comparison and Limitations of Various Water-Hammer Theories.—R. S. QUICK.—This paper makes a general comparison between the principal theories and formulas for water hammer produced near the outlet of a closed conduit by closure of the discharge orifice or gate. The accuracy of the elastic-water-column theory is emphasized and confirmed by experimental test data, and charts are given for graphically solving problems of maximum pressure rise with uniform gate motion and complete closure. Water-hammer theories advocated during recent years are divided into two classes by the author—those which consider the elastic properties of the water and conduit walls and those which neglect elasticity and instead treat the water column and pipe as rigid and apply the laws of motion directly. The author says that the elastic-water-column theory provides an accurate method for investigating pressure rise in a closed conduit for any known gate-closure characteristic. The limitations imposed in establishing the characteristics for the ideal pipe line should not materially modify or influence the practical hydraulic-power pipe-line problem. Friction is almost always a negligible factor and may be disregarded when small in proportion to the total head. It is difficult to accurately consider its influence as it is distributed along the pipe line. Reference is made to Gibson and Durand as having discussed a way in which friction may be approximated by assuming the friction head as proportional to the square of the velocity in the pipe at the point under consideration. The damping or attenuation of pressure waves is of little consequence as affecting closure in hydraulic-power-plant study. The amount depends, according to the author, upon the pipe line and initial condition. Here, again, test data must be studied to establish analytical factors as to damping along the pipe line and reflection at the ends. —*Mechanical Engineering*, Mid-May, 1927.

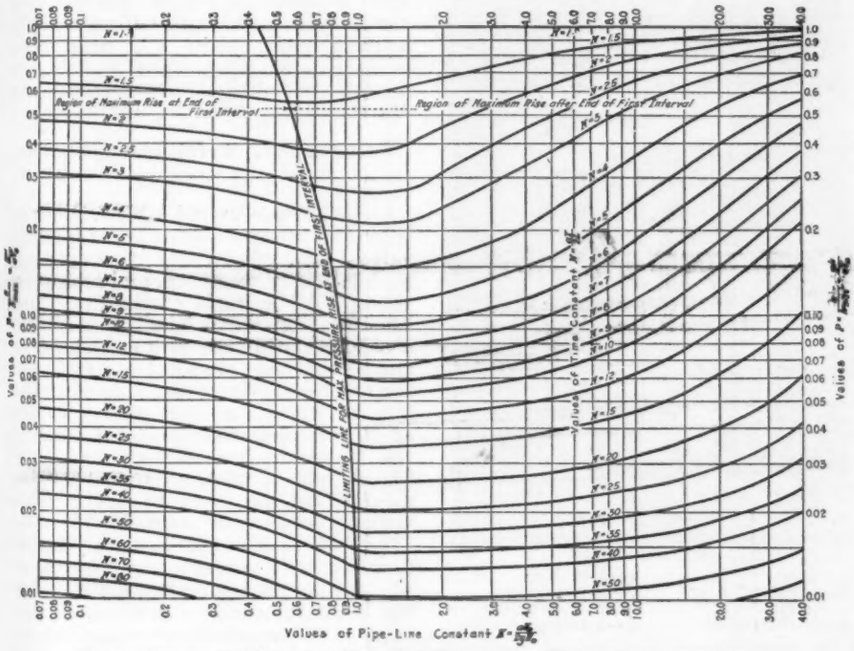

Region of Maximum Rise at End of First Interval
Region of Maximum Rise after End of First Interval
LIMITING LINE FOR MAX. PRESSURE RISE AT END OF FIRST INTERVAL
Values of Time Constant K
Values of Pipe-Line Constant K
Values of K h/Ho
Values of K h/Ho

CHART SHOWING MAXIMUM PRESSURE RISE WITH UNIFORM GATE MOTION AND COMPLETE CLOSING

(Note ratio of pressure rise h to initial steady head H_o determined from relation $2\,KP = h/H_o$.

Generation, Control, Switching and Protection

Rupturing Capacity of an Oil Circuit Breaker.—E. B. WEDMORE, W. B. WHITNEY and C. E. R BRUCE.—This paper was read April 7 before the Institution of Electrical Engineers (England). It examines into the problems of a number of tests required to establish the rating on oil circuit breakers. The authors first studied the simplest case of the single-break, single-phase circuit breaker, but investigation of the three-phase case is in progress and sufficient work has been done to show its extreme complexity. A start on the work was made with the case of a short circuit between two poles of a 5,000-kw., three-phase generator with a fixed open-circuit voltage of 5,500, negligible external impedance and a power factor of about 0.1. The circuit breaker had a single break opening at about 100 cm. per second, with about 10 cm. head of oil and a negligible magnetic blow-out. Investigations indicate that if a single-phase, single-break circuit breaker clears twice without serious distress a single-phase, dead short-circuit on a supply capable of giving a maximum of 10,000 kv., all that can be assumed is that the circuit breaker is safe for operation on 400 kva. This result is subject to the presence of certain test conditions. If the circuit breaker clears five tests at 10,000 kva., it is safe for operation at about 1,200 kva.; if it clears ten tests, it is safe for operation on 2,000 kva., and if it clears 50 tests, it is safe for operation on 5,000 kva. These results indicate that there is little hope of being able to check the rating of an oil circuit breaker by the methods usually accepted in commercial testing without making a prohibitively expensive number of tests. Moreover, the necessary number of tests would have to be greatly increased unless the arc energy output that will just cause a given criterion of distress is accurately found by some other means.—*Engineering (England)*, May 20, 1927.

Static Condensers.—R. MENJELOU.—To restore the lagging power factor of an installation of motors to or near unity, batteries of condensers (so-called capacitors), have become known in late years. In this article the author reviews the entire problem as based upon modern practical experiences. Condensers with solid and oil insulation for low voltages and up to 15,000-volt potential are described. A short account is given of electrolytic condensers, using aluminum electrodes in picric acid as the dielectric. Cost figures and economies of these three types are presented in the shape of generally applicable curves. A mathematical chapter follows, explaining the phenomena of resonance and overvoltages, with protective methods against these. A part of this section indicates how to dimension a condenser for any given service. Examples are given of existing installations of condenser batteries.—*Revue Générale de l'Electricité*, April 16 and 23, 1927.

Transmission, Substations and Distribution

Large Single-Phase Transformer.—F. RÜDENBURG.—What is said to be probably the largest single-phase transformer in the world is described in this article, which gives details of a 16⅔-cycle, 11,400-kva. transformer, stepping 88,000 volts down to 15,000 volts and serving the electrified section of a German railway. Recalculated for 60 cycles and three-phase, this machine would be equivalent to a 100,000-kva. transformer. As is customary for railway service, the copper and iron losses are so distributed as to give highest efficiency (98.44 per cent) at one-half load. Since is was required to ship the transformer complete with oil in its tank, the over-all height of the machine had to be limited to a minimum. For this reason a special tank was designed, the cover of which is made a part of the upper transformer yoke. Circular-disk coil windings give the transformer the necessary rigidity against short-circuit forces. Externally cooled oil dissipates the losses of the transformer. The complete unit, including oil, weighs 54 tons.—*A.E.G. Progress*, April, 1927.

Manitoba Power Company Extensions.—H. C. HOWARD. — This story

deals with the increased load on the Great Falls plant of the Manitoba Power Company and the signing up of the contract for the Manitoba Paper Company. The additions consisted of the installation of a third 21,000-kva. alternator, coupled to a vertical water turbine having a rating of 28,000 hp. This machine is a duplicate of the first two machines installed in the Great Falls plant, with a few modifications and improvements which have since been developed, including the automatic valves for the admission of air to the draft tube, which are controlled from the gate mechanism. A description is also provided of the steel-tower transmission lines which were erected through the forest, and some of the problems of that work are detailed by the author.—*Electrical News (Canada)*, May 15, 1927.

Illumination

High-Voltage Street Lighting. — A. TORQUET.—The article advocates street lighting with parallel-connected 1,000-watt, 110-volt incandescent lamps fed from an underground 3,000-volt cable. Under each lamp post a junction box is inserted in the cable, containing a 1,000-watt shell-type transformer, 3,000/110 volts, which operates in cable compound as a dielectric. Savings as high as 40 per cent are claimed for this system as compared with a 110-volt distribution. A large amount of mathematical and cost data are given to substantiate this claim. The copper and iron losses of the transformer are kept to such low values that under the most unfavorable conditions a temperature rise of only 28 deg. C. has been measured. Within the box are high-voltage fuses which disconnect the primary in case of a fault in the winding.—*Revue Générale de l'Electricité*, April 9, 1927.

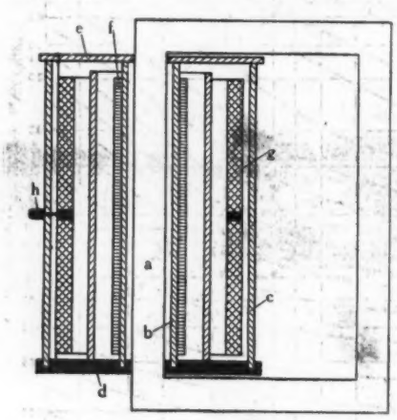
Motors and Control

Speed Regulation of Induction Motors Through Regulation of Primary Voltage. — SVEN NORBERG. — The author points out the possibility of obtaining speed regulation of induction motors by primary voltage regulation. The method is possible only when the torque varies rapidly with the speed, as in blowers, for example. The efficiency is shown to be practically the same as that for regulation by secondary resistance.—*Teknisk Tidskrift, Elektroteknik*, March 5, 1927.

Application of Direct-Connected Synchronous Motors to Carbon-Dioxide Compressors. — D. W. MCLENEGAN.—The author in this article discusses the use of direct-connected synchronous motors with carbon-dioxide compressors, enumerating the problems both in torque requirements and flywheel requirements which are different from those of corresponding ammonia compressors. While the single-acting vertical type of carbon-dioxide compressors are, from the motor viewpoint, very similar to ammonia compressors, the other two types have somewhat different requirements. Although no easy means has yet been found for reducing the requirements of the single-cylinder carbon-dioxide compressor, the situation with regard to the duplex double-acting compressors has been simplified, according to the author, by changing the angle between cranks from 90 deg. to 180 deg. The power requirement of the crank-end stroke of one cylinder is then added directly to that of the head-end stroke of the other cylinder. The unbalance of starting is eliminated because equal forces on the piston being directed toward the crank end produce two equal and opposing torques at the motor shaft.—*Power*, May 24, 1927.

Units, Measurements and Instruments

High-Voltage Testing Transformer. —A. MEYERHAUS. — To reduce weight and bulk of testing transformers a large Swiss company has developed a new type in which only the windings are oil-insulated while the iron core remains in air. A vessel is formed with a large external insulating cylinder, a smaller internal cylinder and a ring bottom and top. Within the annular oil-filled space between the two concentric cylinders are placed the low and high voltage windings. Since the latter is made in two parallel halves



CROSS-SECTION OF HIGH-VOLTAGE TESTING TRANSFORMER

a—core	*e*—top ring
b—inner cylinder	*f*—l. v. winding
c—center	*g*—h. v. winding
d—bottom ring	*h*—terminal button

with the two extreme ends grounded, a small metallic button at the middle of the exterior cylinder forms the high-voltage terminal of the transformer. The iron core passes through the inner cylinder. The arrangement is shown in the sketch. Since it was possible to build such a transformer for 750 kv., two of them will give 1,500,000 volts with the middle point grounded.—*Brown Boveri Mitteilungen*, April, 1927.

Some Fundamental Principles of Church Illumination. —EDWARD RAMBUSCH.—The co-ordination of the specific requirements and viewpoints of the engineer, the architect, the clergyman and his congregation as related to church lighting is discussed. The problems involved in lighting various parts of church edifices are presented, with the author's solution for each, and the arrangement and location of the lighting units, as well as the importance of achieving a pleasing and harmonious effect which will enhance the beauty of the architecture, are treated. —*Transactions of Illuminating Engineering Society*, May, 1927.

Traction

Automatic Block Signal System.—D. D. ARNDT.—Since the electrification of the steam-operated rapid transit system of Vienna the number of trains operated has been greatly increased, rising from 25 to 40 an hour. A more reliable train signaling and blocking system, preferably of the automatic type, became therefore a necessity. In the present article is given a detailed description of the design and the installation of the system, which, it is claimed, is among the most modern of Continental types. The entire system is operated by alternating current, which is derived from the city supply as three-phase, 5,000-volt, 50-cycle current. Transformed to 500 volts, the signal current is distributed in underground cables along the right-of-way and feeds over special high-leakage transformers 2, 16, 24 and 120 volts for signal and relay circuits. All signals along the road are of the lamp type; no arm semaphores are in use. Every signal lamp contains two 16-volt, 25-cp. single-filament lamps. A metal hood is placed over every signal to increase daylight visibility.—*Elektrotechnik und Maschinenbau*, April 24, 1927.

Telegraphy, Telephony, Radio and Signals

Cooled Anode Valves.—W. J. PICKEN. —In this paper three main types of anode valves are described, transmitting, modulating or absorbing, and rectifying valves. An example of the first type, illustrated in the original paper, uses a copper anode tube of 5 cm. diameter and 23 cm. long, closed at one end. On the other end is brazed a ring of nickel iron on which the large glass cylinder of 70 mm. diameter is sealed. Inside the anode are the cathode and grid. The former is made of tungsten wire mounted in the form of a *W*. This cathode requires 50 amp. at 20 volts. The grid consists of a mesh of fine tungsten wire supported by four tungsten rods. An approximate figure for the bombardment of the anode of this valve is 12 kw. at 20,000 volts from an alternating-current supply. The grid is heated by bombardment, 1½ kw. at 600 volts. For larger valves the anode bombardment may be 18 kw. at 20,000 volts and the grid 2.0 kw. at 600 volts. The valve is capable of standing a dead-loss test of 7.5 kw. at 15,000 volts without impairing the vacuum. On oscillatory tests it has taken an input up to 30 kw. at 15,000 volts. In the next section of the paper brief descriptions are given of other forms of valves. One type, for transmission on long wave lengths, has a lengthened electrode and an increased effective area of cathode. The filament wattage is 50 per cent greater than in the case of the valves previously mentioned. Another "double-end" valve is designed for use as a transmitting valve on short-wave steam stations. The filament and grid are mounted on glasswork at the opposite ends of the tubes. The grid seal and its leads can carry continuously a current of 100 amp. Oil is sometimes used for cooling such valves in order that the dielectric losses in the water may be avoided.—*Electrician (England)*, May 13, 1927.

News of the Industry

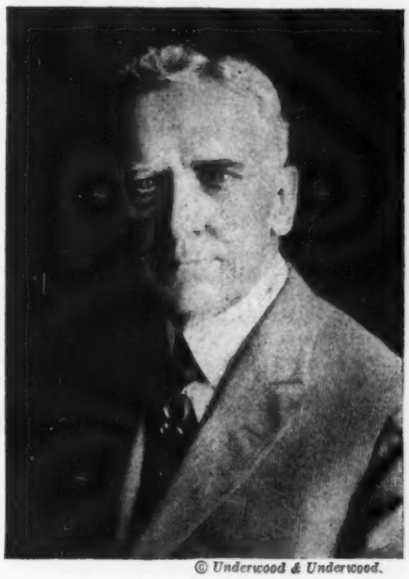
Guy E. Tripp Dies After Long Illness

Chairman of Westinghouse Board Succumbs at Age of 62—Born in Rural District of Maine, He Rose Steadily to Prominence in Electrical and Industrial Circles

HOPES for the recovery of Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, who had been seriously ill for about four months as the result of complications following an intestinal operation, have been thwarted, his death taking place at the New York Hospital, New York, at 7 o'clock on Tuesday evening, June 14. General Tripp had so far recovered that on several occasions he had been able to leave the hospital for a drive, and his complete restoration to health was at one time eagerly anticipated. Last month, however, a new, though minor, operation became necessary, and although he rallied from this and had even reserved accommodations at Atlantic City for the convention of the National Electric Light Association last week, a relapse set in and he failed rapidly. For about five days before his death he was unconscious. The funeral service was to be held on Friday morning at All Saints' Unitarian Church, New York City.

Born in the rural village of Wells, in the southeast corner of Maine, on April 22, 1865, exactly a week after the death of President Lincoln and while his body was still being conveyed by slow stages to Springfield, Guy Eastman Tripp was destined to become a typical American man of affairs of the upright and masterful type that has remade the United States in the two generations since the Civil War. His academic instruction was obtained in a two-year course at the South Berwick Academy, near his birthplace. Subsequently he was employed as a boy in a country store at Wells, and here, according to tradition, he learned some fundamental lessons both in trading and in handling customers that stood him in good stead when in later life he was able to apply them to larger things.

Young Tripp's business career began in earnest in 1883, when the Eastern Railroad—now part of the Boston & Maine—employed him as a clerk at Salem, Mass. After seven years with the railroad he changed his post for one with the United Electric Securities Company. With this company, the Thomson-Houston Electric Company and the Industrial Improvement Company, a branch of the then newly organized General Electric Company, which had absorbed the Thomson-Houston firm, he spent another seven years working as accountant and auditor. Then, in 1897, at the age of 32, he began a connection with Stone & Webster, already engaged in the development of public utilities, that opened before him the path of substantial success. He was soon appointed a traveling auditor for this company, then was made a manager of utility properties in the West and South, and finally a vice-president of the parent engineering and management organizations. In addition he came to fill high executive offices in subsidiary companies in the States of Texas, Washington, Kentucky, Minnesota and Massachusetts.



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GUY E. TRIPP

Reorganizes a City Railway

Mr. Tripp's record for efficiency and his acquisition of wide knowledge in traction matters led to his being chosen in 1910 as chairman of the joint committee on reorganization of the Metropolitan Street Railway in New York City, which had just passed into the hands of a receiver. This was a difficult and exacting task. The Metropolitan had many subsidiaries; the receivership had caused a panic among stockholders; possessors respectively of senior and junior securities were engaged in internecine warfare, and disaster loomed. For two years Tripp worked at his new task, evolving by degrees a solution that proved acceptable to the conflicting interests and gave him a national reputation in financial circles.

Joins Westinghouse Forces

His reward came in January, 1912, when he was unanimously invited by the directors of the Westinghouse Electric & Manufacturing Company to become chairman of their board. He went to the company while it, too, was emerging from a receivership, forced on it during the troublous times of 1907. It had been piloted through the crisis by Robert Mather, whose death left the vacancy that Mr. Tripp was called to fill. His duties concerned in the main the financial and foreign interests of the company, and he carried out, with clear insight and a firm hand, the reorganization of its capital structure and did much to place it on the impregnable basis it now occupies, with annual gross earnings (as of March 31, 1927) amounting to $185,543,000 and a net manufacturing profit of $15,779,000. On assuming the chairmanship of the Westinghouse board Mr. Tripp resigned from the Stone & Webster organization.

Service in War Time

When the United States entered the Great War, Mr. Tripp was appointed by the Department of War chief of the production division of the Ordnance Department, intrusted with the task of supervising and stimulating the production of all ordnance supplies. He was brevetted an officer and soon rose to the rank of brigadier-general—the title of "General," by the tacit insistence of his friends and associates, sticking to him for the rest of his life. When the war first broke out, the Westinghouse company had obtained large contracts from the British and Russian governments for the manufacture of munitions, and Mr. Tripp was thus able to bring not only his great ability but the highest type of experience to his new duties. He cut through red tape and decentralized bureaus with a vigor of action and clearness of perception such, it was declared, as official Washington had seldom seen, dividing the country into districts, each in charge of a district chief, and supervising the expenditure of sixteen billion dollars. For his patriotic services General Tripp received from Congress a "distinguished service" medal.

Leave of absence was granted the General by the Westinghouse board during his war-time service. When the conflict was over he resumed his duties with the company. In 1923 these took him to Japan in connection with recon-

struction work after the disastrous earthquake. He completed arrangements in that country for the organization of a manufacturing company at Nogoya with $7,500,000 capital. The Japanese government conferred upon him the highest decoration that it could award to a civilian foreigner.

When the radio industry first gave indication of the enormous growth it was to have, Mr. Tripp, following the historic policy of his company as a pioneer in new fields, put his influence and energy behind the nascent art, and to him was due in large measure the position of leadership in radio manufacture and broadcasting that Westinghouse assumed and maintained. Another favorite interest of Mr. Tripp's was "superpower." He was among the first who grasped the part that interconnection would come to play in the world of light and power, and he did much to bring its significance home to the public at large. Sometimes, indeed, in view of the proneness of the lay world to acquire an exaggerated idea of the possibilities of electric service and an unduly small idea of its production cost, conservative directors of utility holding and operating companies may even have thought him just a little too enthusiastic as a prophet.

Dominant Characteristics

Associates and friends of Mr. Tripp unite in declaring his success due to the possession of the organizing and executive type of mind developed to the full with no handicap of timidity. He was a business leader, a financier and a harmonizer. Although in his earlier days he must have displayed the ability to master detail, he did not make the mistake of burdening himself with it after he was called upon to command. He would get at the heart of a problem, shape a policy and leave others to work it out. He was not an engineer, but he could point the way to engineers. He always kept at heart the interests of the people at large and, while an advocate of private ownership of utilities under state regulation, was, whether right or wrong, broad-minded enough to declare that there might be conditions under which public ownership would be effective and private ownership helpless, adding: "The matter of ownership is for the people."

Versatility was another prominent trait in Mr. Tripp. It was shown by his membership in many clubs and societies devoted to such a wide range of interests as engineering, electrical development, railroads, economics, politics, learning, sports and social intercourse. Despite his increasing activities, he found time for recreation, writing and public speaking, and as a contributor to periodicals and a maker of addresses his services were widely sought. At the time of his death he was a director in 25 commercial or industrial firms, including Westinghouse subsidiaries. Among these firms were the American International Corporation, the American Sugar Refining Company and the American Surety Company. He was married in 1887 to Miss Mary E. O'Connell of Salem, Mass., who with three married daughters survives him.

Tributes and Appreciations

From General Tripp's large circle of friends and associates a great number of expressions of sorrow, admiration and personal regard were elicited when news of his death became public. A few of these are printed below:

From PAUL D. CRAVATH, *general counsel Westinghouse Electric & Manufacturing Company:*

"General Tripp will be greatly missed in the wide field of business and public activities in which he has been prominent for many years. He was much more than the chief executive of a great corporation—he was a real leader in the industrial world. His qualities of leadership were never more conspicuously displayed than during the war, when he was chief of the production division of the Ordnance Department. The same qualities that made him so successful in that important work gave him an exceptionally wide influence in the electrical industry. Important as is his loss to the business community, his associates in the enterprises in which he was active, and more especially the Westinghouse Electric & Manufacturing Company, will miss him most keenly as a loyal friend and a considerate and inspiring associate. There are few men in the business world who will be so sincerely mourned by so wide a circle of friends."

From SAMUEL M. VAUCLAIN, *president Baldwin Locomotive Works, Philadelphia:*

"The death of Guy E. Tripp is a personal loss to me. A long-time acquaintance had endeared him to me, not merely on account of his exceptional capacity in business matters, but because of his high ideals of citizenship and his generous loyalty to his friends upon all occasions."

From M. C. BRUSH, *president American International Corporation:*

"The electrical industry has lost in the passing of General Tripp one of its great pioneers, leaders and executives. I know of no man who had more friends, and in my entire acquaintance with him over a period of twenty-five years I have never heard other than the most kindly commendatory expressions about him by every one who knew him. He was a man to whom all his friends could go for advice, counsel and guidance, and he always received them in the same genial, cordial, friendly manner and undertook to do for them anything within his power. His memory will live long in the hearts of us all."

From DAVID SARNOFF, *vice-president Radio Corporation of America:*

"I feel broken-hearted over General Tripp's death, as I regarded him as a friend. No man was more sympathetic toward the development of the radio art than General Tripp, and his death means a great loss to that art and to the industry which has fostered it."

From GERHARD M. DAHL, *chairman of the board Brooklyn-Manhattan Transit Corporation, New York City:*

"General Tripp was a man of great ability, great heart and great soul. He was not only successful in all that he undertook but he tied his friends to him with hoops of steel. His death means not only a loss to a community but also to a host of loyal and admiring friends."

From R. H. BALLARD, *vice-president Southern California Edison Company, Los Angeles, and chairman of public policy committee, N.E.L.A.:*

"To the electric light and power industry General Guy E. Tripp was more than a friend. He was a genial host, loyal supporter, outspoken defender and wise counselor. The public policy committee of the National Electric Light Association, of which General Tripp was for years an active member, was always deeply appreciative of these qualities. Having expressed to him months ago the hope for his speedy recovery, the committee is naturally shocked by the news of his death. General Tripp's loss is not only felt personally but nationally. He was an outstanding American, an executive of ability, a sympathetic and understanding friend, a man of integrity and character, whom it was ever a delight to know and is a great sorrow to lose."

From MARTIN J. INSULL, *president Middle West Utilities Company, Chicago:*

"In the death of General Guy E. Tripp the Westinghouse Electric & Manufacturing Company lost a great executive, the electrical industry lost a man whose ability and perfect fairness were tremendously constructive factors in its development, and those who knew him lost a charming, delightful and valued friend."

From H. HOBART PORTER, *president American Water Works & Electric Company:*

"We have suffered a great loss in the death of General Tripp. Particularly will the electric utilities miss his kindly and always helpful direction and the guidance which his fine business ability qualified him to give. His influence for good was very strong in all his activities, both in commercial business and in war work. Few came into contact with him without being benefited by the geniality and magnetism which he always radiated. These qualities, in addition to his unusual ability, breadth of view and rugged honesty of purpose, endeared him to all with whom he came in contact."

From B. C. COBB, *vice-president Commonwealth Power Corporation:*

"I have known General Tripp for many years and appreciated more than I can say his friendship, kindliness and constructive advice. He will be missed not only by the Westinghouse company, but by the world at large and particularly by the great electrical and other industries of the country, in whose problems he was always deeply interested and for whom he was always ready to give help and assistance. General Tripp was a kind man, a thoughtful man and an industrious man. His passing away at the early age of 62 is greatly to be regretted. His life and accomplishments are a splendid example of what can be done by American youth in this great country of ours, which has been built up because of personal initiative and endeavor of men like General Tripp."

From GERARD SWOPE, *president National Electrical Manufacturers' Association:*

"It is with deep sorrow that all members of the National Electrical Manufacturers' Association see the passing of such a fine man as General Guy E. Tripp. His association with the electrical industry has always been a helpful and constructive one, and his personality has won for him the respect, admiration and affection of all its members. His record of achievement, both in war and in peace, will serve as inspiration for the industry."

From JAMES H. MCGRAW, *president McGraw-Hill Publishing Company, Inc.:*

"Apart from the important office that he filled, General Tripp's versatility and personal force made him one of the dominant figures in the electrical industry. His influence reached beyond the manufacturing sphere and embraced all electrical enterprise. As chief executive of the great Westinghouse interests his work was of tremendous importance to electrical men everywhere. In the light and power field the steady growth of interconnection owed much to him, and so did the spread of interest in good public relations. He was a steadfast friend of the technical press, to which he contributed much encouraging retrospect and prophecy through interviews and original articles. But among those who had the privilege of calling General Tripp their friend all such considerations are swallowed up in sorrow for the loss of an associate with so many sterling qualities, whose society was a stimulus and a delight. There was a nobility about him that endeared him to all. His genuineness and his faith in the electrical industry, in his co-workers and in his own ideas were a great resource to many men. He had splendid qualities of leadership that will be long remembered."

From OWEN D. YOUNG, *chairman of the board General Electric Company (radio message from SS. "George Washington"):*

"The death of General Tripp takes from the electrical manufacturing industry one of its ablest and most charming men. He had all the qualities of a great leader, the capacity to foresee, the courage to act and the ability to execute. I have known him intimately for more than ten years with constantly increasing admiration and affection."

Others who expressed briefly, by wire, their sense of what the electrical industry, the business world and they themselves personally had lost through the death of General Tripp were Samuel Insull, president Commonwealth Edison Company, Chicago; E. S. Webster, president Stone & Webster; M. S. Sloan, president Brooklyn Edison Company; Thomas N. McCarter, president Public Service Corporation of New Jersey; Charles L. Edgar, president Edison Electric Illuminating Company of Boston; W. E. Creed, president Pacific Gas & Electric Company, San Francisco; E. H. Gary, chairman United States Steel Corporation; L. F. Loree, president Delaware & Hudson Railroad, and J. S. Alexander, chairman National Bank of Commerce.

Steel-Mill Engineers Meet at Pittsburgh

Electric Heat Applications, Synchronous Motors in Rolling Mills and Reduction of Power Requirements with Anti-Friction Bearings Attract Attention

STEEL - MILL electrical engineers held their twenty-third annual convention at Pittsburgh June 13 to 18 inclusive, affording about 150 mechanical and electrical manufacturers the opportunity to exhibit their products. Sessions of the Association of Iron and Steel Electrical Engineers were devoted to electrical developments, safety, anti-friction bearings, application of synchronous motors to steel mills, combustion engineers' problems and steel-mill illumination. A whole day was given to consideration and inspection of electrical installations at the Homestead Steel Works of the Carnegie Steel Company.

The two committee reports on electrical developments—one on electrical heating and the other on motors and control, by George H. Schaeffer and W. H. Burr respectively—were intended to serve as encyclopedias of reference and drew forth considerable discussion. For example, speakers pointed out that there is a tendency toward a single voltage for foundry melting (between 175 volts and 220 volts). Opportunities to remodel furnaces, use other electrodes than carbon and obtain better quality babbitt by electric melting were seen. Some steel mills, it was said, are trying out small furnaces to heat-treat tools, but primarily to ascertain applicability to larger tonnage jobs. With power at one cent per kilowatt-hour, electricity has been found to compete with oil in heating bar stock in 20,000-lb. furnaces. It was reported that 164 roll heaters are in use; in at least two or three mills they are reducing cost and giving better product. Interest was shown in bright annealing, the heating of hot tops and the possibility of heating coke-oven gas to desulphurize it. Currency was given to a rumor that a resistor is being developed to withstand 8,000 deg.

Regarding other than electric heat developments, it was brought out that a steam-driven 24-in. bar mill was electrified in 122 hours. Synchronous motors are being used for main roll drives. An electric drive 40-in. blooming mill turned out 104,000 gross tons in one month. Explaining the apparent preference for motor-generators over rotaries in steel mills, one speaker alluded to their ease of voltage and power-factor control and small maintenance. The possibility of no longer needing flywheels in steel mills and of more extensive use of mercury rectifiers was suggested. Roller and ball bearings have revolutionized many steel-mill applications, it was brought out. Means of using one control for all furnace and soaking-pit doors was announced. Planetary-gear drive for cold saws is being found very satisfactory. Electromagnets were highly commended as material handlers, but care is necessary to avoid troubles. The trend toward individual drives throughout steel mills was emphasized.

Safety was discussed from three viewpoints—power utility, coal mines and steel mills, A. N. Cartwright, George E. Gramm and Thomas E. Hughes presenting them. Mr. Cartwright outlined the West Penn Power Company's method of handling safety through the system operator, tagging, simple station rules, analysis of errors and periodic inspection. Mr. Gramm considered features of installation that make for safety. Mr. Hughes presented an excellent paper on the main causes of accidents and means of overcoming them. Means of preventing accidents at the time of installation, construction or rehabilitation have been neglected, it was declared.

Judging by attendance at the symposium on anti-friction bearings, this subject developed the most interest at the convention. Representatives of four bearing manufacturers—F. H. Buhlman, E. C. Gainsborg, Fred Waldorf and C. J. Klein—discussed factors affecting the selection of bearings, Mr. Waldorf submitting some interesting data on comparative friction loads and unit energy consumptions when rolling billets with plain bearings and with tapered roller bearings. Operating viewpoints which were supported by many other men were presented by F. W. Cramer, Bethlehem Steel Company, who advised giving sleeve bearings careful consideration wherever a decision between them and anti-friction bearings is involved, because of their ease of construction and application, low inventory cost, the small attention required in stock, and their long life.

D. M. Petty urged standardization of the outside and inside diameters of anti-friction bearings intended for the same duty before the problem becomes too costly to permit interchange of bearings. Labyrinths, flingers and piston-ring seals were named by different discussers as means of keeping water and scale out of anti-friction bearings. A. J. Standing declared that if 40 to 60 per cent of rolling-mill loads can be eliminated by anti-friction bearings, it may be possible to handle operations in one mill which now require costly and time-consuming transferals of product to other mills.

The paper on application of synchronous motors in steel mills was presented by Harry A. Winne, who discussed chiefly their characteristics and the duties to which these may be applied. H. V. de Putman discussed extensively the interdependence of characteristics of modern synchronous motors, emphasizing that any characteristics may be improved but usually at the sacrifice of others, so that operators should jointly signify the relative importance of characteristics.

C. A. Menk described electrical features of the Homestead Steel Works, and Ward Harrison discussed changes in steel-mill illumination.

U.G.I.Will Control Day & Zimmermann

Amalgamation of the Two Philadelphia Groups Gives the Gas Organization a Conspicuous Place Among the Owners of Electric Light and Power Companies

CONTROLLING interest in Day & Zimmermann, Inc., of Philadelphia, has passed to the United Gas Improvement Company of the same city, which not many weeks ago bought an interest in the National Public Service Company after Day & Zimmermann with others had acquired this company from the A. E. Fitkin interests. The merger of Day & Zimmermann now announced is subject to the formal approval of U.G.I. stockholders.

Arthur W. Thompson, president of the United Gas Improvement Company, said that the transaction was in line with his company's policy to extend its activities in co-ordinated public utility management, engineering and construction, as well as to acquire financial interest in such properties as might offer opportunities for consolidations and development of benefit to the public and investors.

Day & Zimmermann are interested in and operate public utility properties in fourteen states, serving approximately 935 communities, with a population of 2,369,000 persons. Gross earnings of the larger properties under their management approximated $34,000,000 last year. The three principal properties under their direction are the National Public Service Company, just referred to, which through its subsidiaries in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, Georgia and Florida furnishes electric light and power, gas, steam and electric railway, bus, ice and water service to 874 communities with a population of 2,139,000, the consolidated gross earnings of the company amounting to $27,788,600; the General Public Utilities Company, which furnishes directly or through its subsidiaries electric light, ice and water to 60 towns in Florida, Louisiana, Texas, New Mexico, Arizona and South Dakota, with an aggregate population of about 200,000, its gross earnings being $4,055,000, and the Southern Ohio Public Service Company, which is an operating company serving the city of Zanesville, Ohio, with electric light and power, street-railway, bus and interurban transit, gross earnings of $1,546,800 being derived by this company.

Among electric light and power companies previously controlled by the United Gas Improvement are the Philadelphia Suburban Counties Gas & Electric Company, whose establishment as the result of a merger of the U.G.I.'s Pennsylvania properties was reported in the ELECTRICAL WORLD for May 7 (page 977) and the Iowa Public Service Company, the outcome of another merger reported on March 19 (page 623).

Day & Zimmermann, Inc., was established as a partnership in 1902. "There will be no change in the method of conducting the business of the firm," Mr. Thompson announces, "which will continue under the direction of Messrs. Day and Zimmermann and their capable associates and organizations." This union of the U. G. I., with its immense resources, and Day & Zimmermann, whose executive and financial ability has won wide recognition, is considered a happy one in light and power circles.

New Detroit Municipal Plant in Operation

The new municipal power and lighting plant of the city of Detroit, at the foot of Morrell Street, for which the people voted a bond issue of $12,000,000 in 1923, swung into full operation last week, when it took over the main load from the Atwater Street plant. Several units of the plant had been functioning for ten days previously. The Atwater Street plant will be rebuilt as a substation.

The plant is now furnishing light and power to all city buildings, including schools, police stations, fire engine houses, hospitals and libraries, according to Frank R. Mistersky, general superintendent of the Department of Public Lighting, and in addition is supplying all street lighting, much of the energy required by the department of street railways, and power for sewage-pumping stations and the city's water-supply system.

The cost of the plant itself was $7,000,000, while the remainder of the bond issue and $1,000,000 in addition were spent in building substations and switching stations and for conduits and cables, according to the announcement.

The plant is thoroughly modern in every way. Three 20,000-kw. turbo-generators are included in the generating equipment, and a fourth can be installed when needed. All furnaces burn powdered coal. Fuel is delivered by boat at a considerable saving over rail rates.

Los Angeles Rejects Power Bureau Plan

Two Measures of Local Authorities to Extend the Domain of Public Ownership in California City Are Defeated by Decisive Majorities in Light Vote

VOTERS of Los Angeles last week defeated by substantial majorities the two measures submitted to them by the municipal Power Bureau and described in the ELECTRICAL WORLD for May 21 (page 1081). These projects were known as Propositions Nos. 3 and 4. Proposition No. 3 provided for the condemnation and purchase by the city of the generating plants, transmission lines and distribution system of the Los Angeles Gas & Electric Corporation. Proposition No. 4 provided for taking over harbor lands by the Power Bureau for a steam plant—the scheme which the Southern California Edison Company has been fighting in the courts. The total vote cast was very light, since in some districts there were no contests for membership in the City Council and interest in what were called the bureau's "grab" proposals was in these cases the only thing to bring citizens to the polls. In such cases advocates of a policy or innovation are more likely to exercise the suffrage than opponents. Complete returns were as follows:

	For	Against
Proposition No. 3	46,596	72,353
Proposition No. 4	48,763	67,457

The proposal to acquire the Los Angeles Gas & Electric Corporation's system thus lost by nearly 26,000 and the proposal to buy the site for a steam plant by more than 18,500 votes.

BUREAU CUTS LIGHTING RATE

Seemingly to maintain a differential favoring the municipal utility, the Bureau of Power and Light of Los Angeles, by action of the City Council on June 15, authorized a reduction in the top lighting rate from 5.6 cents per kilowatt-hour to 5 cents. This betters the top lighting rate of 5.6 cents per kilowatt-hour recently established by the Southern California Edison Company, which serves in contiguous territory. The rate is to become effective on Aug. 1. Reductions were also made in the combination cooking and heating rate and in certain classifications in the power schedule.

San Francisco Defeats Spring Valley Water Project

The voters of San Francisco at a city election on June 14 rejected a proposal to authorize a forty-million-dollar bond issue for the purchase of the Spring Valley water system for the distribution of the city-owned Hetch Hetchy water supply, now under development. A further reluctance on the part of the public to spend public moneys for the extension of municipal utilities in San Francisco was indicated by the failure of a measure authorizing the issuance of bonds to build an addition to the municipal railway system. At the same time the voters passed by the necessary two-thirds majority two other bond issues for civic improvement not of a municipal utility character.

Good Talks at Santa Cruz

Engineering and Commercial Topics Well Handled at the Pacific Coast Electrical Convention

WITH a number of outstanding speakers contributing to the eleventh convention of the Pacific Coast Electrical Association, 535 members met at Santa Cruz, Cal., on June 14 for four days' sessions. President S. Waldo Coleman enunciated the keynote of the convention when he said, in his presidential address: "Progress follows light and power." Many good papers and addresses filled the engineering and commercial sessions. A report of these will appear in the ELECTRICAL WORLD next week.

Purchases and Mergers

Danville, Va., Refuses to Sell Its Plant, as Also Does Bay Minette, Ala., but Votes Are Close

ACQUIREMENT of control of Day & Zimmermann, Inc., Philadelphia, by the United Gas Improvement Company, an important announcement made on Monday of this week, is reported elsewhere in this section.

Two projected purchases of Southern municipal plants have fallen through because of adverse action by the voters, though in each case the majority was small. A special election at Danville, Va., on June 10 resulted in a vote of 1,614 to 1,402 against sale of the electric and gas plants, for which the Appalachian Power Company was reported willing to pay $2,750,000. This will probably force the city to install another generator. Permission to the Town Council of Bay Minette, Ala., to sell the municipal lighting plant and distribution system to the Gulf Electric Company at a minimum price of $90,000 was refused by the people in an election held June 7, with 171 votes against and 161 for the proposal.

The Central Power Company of Grand Island, Neb., has purchased for $1,179,380 the electric, gas and water properties of the Nebraska City Water & Light Company, and the two companies will be combined. Both are Middle West Utilities subsidiaries, owned by the Insull interests.

The Nebraska Power Company of Omaha has purchased the municipal lighting plant at Weeping Water, Neb., for $40,000, following an election in which the voters decided by 239 to 15 to sell.

The Northwestern Public Service Company, an Insull property, has completed the purchase for $26,000 of the Platte Center (Neb.) plant, which is to be served from its generating station at Columbus, and of a miscellaneous lot of small-town plants, some of them municipal, in South Dakota, at Hitchcock, St. Lawrence, Wessington, Bristol, Butler, Lily, Bradley, Wallace, Garden City, Henry and Florence, for $146,000.

Electric properties in northwestern Kansas supplying the towns of Goodland, Ruleton and adjacent territory with retail service and wholesaling service to Kanorado are to be sold by the Union Power Company of Kansas to the W. B. Foshay Company of Minneapolis. These properties will be taken over by Public Utilities Kansas Corporation, which is being formed as a subsidiary of the Public Utilities Consolidated Corporation, the new Foshay holding company.

Arizona Polls Big Majority for Colorado Rights

Returns from thirteen of the fourteen Arizona counties in a special election held a week or two ago showed that the two proposed amendments to the state constitution, both relating to the Colorado River development controversy, had passed by a vote of approximately three to one. The tabulation of returns showed a vote of 6,635 in favor of striking out of the state constitution a provision providing for tax exemption of federal properties within the state and 2,147 against. The vote on the second amendment reached 6,587 for and 2,096 against. This amendment would remove from the state constitution a provision permitting the federal government to reserve any or all dam sites in the state. The incomplete returns indicated that but three counties—Yuma, Navajo and Cochise—voted against the amendments.

Electrical Safety Conference Decides to Dissolve

The Electrical Safety Conference at its regular quarterly meeting, held in New York City on June 15, reviewed its activities and decided to dissolve. The decision to dissolve the conference was based on the conclusion that its mission has been accomplished and that the work it has been doing is no longer necessary under present conditions and with the availability of other standards-making machinery.

Public Utility Leaders Not for a Washington Office

A campaign of public education to oppose the extension of federal regulation to the public utility companies was decided upon at a meeting of the Joint Committee of National Public Utilities associations held at Atlantic City last week just before the N.E.L.A. convention. The joint committee, of which George B. Cortelyou, president of the Consolidated Gas Company of New York, is chairman, comprises 160 utility men representing the National Electric Light Association, the American Gas Association and the American Street Railway Association.

Before the meeting of the joint committee several of the members were understood to be in favor of establishing an office in Washington from which a campaign against federal regulation could be waged on a national scale. This was said to be especially necessary because Senator Walsh of Montana has promised to press his campaign for federal regulation of utility companies in Congress next December. It was decided, however, that establishment of a Washington office such as those set up by most national trade associations would be decidedly unwise.

Ontario Hydro Men Prophesy, Recall and Exult

Remarkable achievements of the past were recalled, and a still greater future predicted, at a gathering in Kitchener, Ontario, on June 9 to celebrate the silver anniversary of the founding of the Ontario Hydro-Electric system. Just 25 years ago the first meeting to discuss the possibilities of power transmission from Niagara Falls to municipalities in the Niagara district was held in Kitchener (then Berlin). Out of the discussion emerged the great hydro undertaking which the late Sir Adam Beck was to drive to success.

Brigadier-General Charles H. Mitchell, who addressed the original meeting in Kitchener 25 years ago, was one of the speakers. He predicted transmission of power over 500 miles and that in 25 more years Ontario's 1,800,000 hp. will grow to 5,000,000 hp., 800,000 hp. to come from the Ottawa River, a like amount from northern Ontario, 500,000 hp. more from Niagara, and probably 1,100,000 hp. out of the St. Lawrence.

Hydro Commissioner C. A. Maguire said that there were 481 municipalities in the Hydro "wheel" and that they had saved the people of Ontario $16,000,000 in bills, as compared with what these would have been under private ownership.

Melones Dam Now Ready for Power and Irrigation

Co-operation between the Pacific Gas & Electric Company on the one hand and the Oakdale and South San Joaquin Irrigation Districts on the other culminated last Saturday, June 11, when the Melones Dam on the Stanislaus River in central California was formally placed at the disposition of the company and the districts to serve henceforth the dual purposes of hydroelectric generation and irrigation. The completed project, which cost $4,700,000, sprang from an agreement between the irrigation districts and the company whereby the districts by a bond issue of $1,100,000 each built the dam and the power company constructed at a cost of $2,500,000 a plant capable of generating 36,000 hp. The power company will pay the districts $5,175,000, distributed over a period of 40 years, to enable them to pay interest on the bonds and retire them.

The dam is 200 ft. in height and impounds 112,000 acre-ft. of water. The water stored for irrigation passes through a 4,500-ft. tunnel to the power house, where two reaction turbines operate under a head of about 210 ft.

Competition and Rate Cutting in Nebraska

The suit brought by Attorney-General Spillman of Nebraska, as noted in the ELECTRICAL WORLD for April 2, page 725, against the Interstate Power Company and its subsidiary, the Cedar Light & Power Company of Hartington, to enjoin them from charging less in that city than in 43 other municipalities in northeastern Nebraska, was unsuccessful in that respect, the court holding that since costs of production and volume of business have so large an influence in determining reasonable rates for electrical energy, and since these are variable, the rates in one town cannot be taken as the measure for other municipalities. The court also held that the defendant companies had the right to meet competition in Hartington, and while holding that the 6-cent rate put into effect in competition with the 9-cent rate of the company which had made a contract with the city to build a Diesel-engine plant and turn it over when cost and interest had been repaid out of revenue was below cost, the Cedar Light & Power was allowed to put in an 8-cent rate. The latter and its parent company will ask for an opportunity to show that "one cent under" is not a competitive rate.

the test of which is whether it will get business.

Attorney-General Spillman claims a sweeping victory for the state on all other points. He says that the court found that the defendants had conspired and discriminated for the purpose of preventing and eliminating competition and had enjoined them from continuing to do so by offering the 6-cent rate. The court also enjoined the company from selling below cost and found that the 14-cent rate which was charged by the company before competition appeared was exorbitant. "The state took this action," says Mr. Spillman, "not out of any animosity toward the industry, but to prevent destruction of competition and the maintenance of a monopoly at exorbitant rates. It is a warning that any attempt to destroy piecemeal the competition that is invited by exorbitant rates, by cutting rates at one town and maintaining them at others served by the same company, will not be permitted by the courts."

Lake Superior Convention's Busy Program

For the steamboat convention, already announced in the ELECTRICAL WORLD, of the North Central Geographic Division of the National Electric Light Association, which embraces Minnesota, North and South Dakota, a full business and entertainment program has been arranged. The steamer *Hamonic* will leave Duluth at 7 o'clock in the evening of Friday, June 24, and at 8:30 p.m. the convention will be opened by the address of President Carl J. Snyder and officers' reports. This session will be followed by dancing.

Saturday morning there will be a golf tournament at Port Arthur, Ontario. When the boat resumes its trip in the afternoon discussions on electric range sales, electric refrigeration, credit problems of light and power companies and ways of effecting a greater use of electric appliances will follow papers by P. L. Miles of Chicago, Louis S. Leavitt of Chicago, John W. DeMaine of Minneapolis and J. W. Devereaux of Chicago on the respective topics. In the evening E. F. McKay, manager Oklahoma Utilities Association, will speak on "Fixing Our Fences," and E. H. Eberdeen of the Westinghouse company on "The Value of Newspaper Advertising."

Sunday morning will afford an opportunity for sightseeing in the two Sauits Ste. Marie, in Michigan and Ontario. On the *Noronic* in the afternoon Dr. E. A. White and Prof. E. A. Stewart will talk about electricity on the farm, and in the evening Lieutenant-Governor W. L. Nolan of Minnesota will preach an "electrical sermon." Back in Port Arthur on Monday, there will be group discussions in the morning at the Hotel Prince Arthur, a luncheon address by M. J. McDonald, president of the local chamber of commerce, sightseeing, a visit to Kakabeka Falls and golf. Officers will be elected on the way back to Duluth in the evening, and President-elect Howard T. Sands of the National Electric Light Association will address the annual banquet.

Briefer News

Power Commission Summarizes Activities in Current Fiscal Year.—Up to June 1 the Federal Power Commission had issued during the fiscal year 51 licenses, covering projects, with a combined primary power capacity of 120,000 hp. On these sites 300,000 hp. will be installed. Eighteen preliminary permits have been issued. They cover 340,000 hp. of primary power and 570,000 hp. of installed capacity.

North Dakota Commissioners Interested in Inductive Co-ordination.—Progress is reported by the Board of Railroad Commissioners of North Dakota in its efforts to get power and communication companies together for the working out of a plan of inductive co-ordination. A committee representing both interests is at work, and its conferences, the Commissioners believe, will iron out much of the trouble without recourse to them becoming necessary, but the state regulatory body stands ready to act when an agreement cannot otherwise be reached.

Petition Against Boston Edison Dismissed.—The suit for an injunction to prevent the Edison Electric Illuminating Company of Boston to erect a power station in Roxbury at 225 Humboldt Avenue, and to review the action of the Department of Public Utilities in granting authority to the company to do so, has been dismissed by Judge Crosby of the Massachusetts Supreme Court, who will, however, report the case to the full court for final determination on the question of the right of the commission to suspend the operation of the zoning law.

Inquisitorial Taxation Act in Oregon to Go to Referendum.—The legislative action of the State of Oregon in empowering tax-collecting agencies to demand that public service corporations and other industries divulge private business transactions in order that the state may ascertain the existence of intangibles subject to taxation has been rendered inoperative, at least temporarily, by the filing of a referendum petition. It is indicative of the unpopularity of the law that the petition contains 33,640 signatures, or 6,000 more than required by statute.

Local Opposition to Potomac Power Scheme Aroused.—Aroused by the plans recently announced to erect a storage dam which would inundate 10 square miles of the fertile Brooks Gap country in Rockingham County, Va., more than 150 land owners of that section have passed a resolution urging Virginia members of Congress to fight against the proposal which has been laid before the Federal Power Commission by the Potomac River Corporation. In addition to inundating farmlands, the proposed dam would, it is said, destroy social and trade relations between the people of the Shenandoah Valley of Virginia and the Lost River Valley of West Virginia, bottling up residents so that they could not reach the outside world except by a circuitous mountain road. The project, it is alleged, would dispossess four thousand farmers and residents of Brooks Gap.

Oswego, N. Y., Aims at Exercising Its Rights to River Flow.—Action aimed at permitting Oswego, N. Y., to develop the full flow of the Oswego River at Dam No. 6 in connection with the hydro-electric development now being made by the Oswego River Power Corporation under a 25-year lease has been taken by the City Council of Oswego. This action is based on legislation of 1920 which agreed to give Oswego the full flow of the river in exchange for a dam and power site destroyed further up the river.

Cumberland County Power & Light Adopts Uniform Rates.—A uniform tariff of electric rates has been adopted by the Cumberland County Power & Light Company of Portland, Me., to cover all its territory except as regards seasonal customers at summer resorts. Under this new schedule a considerable saving will result to domestic consumers outside of Portland, since their top rate will henceforth be the same as in that city—8 cents a kilowatt-hour. Hitherto it has ranged to a point as high as 9¼ cents.

Southwestern Light & Power's Activities.—Besides the 45-mile, 66,000-volt transmission line from Lawton, Okla., to Chickasaw already noted, the Southwestern Light & Power Company has under way or planned for the immediate future 61 miles of 66,000-volt line from Chickasaw to Clinton, 11 miles of 33,000-volt line from Clinton to Bessie, 9 miles at the same voltage from Sayre Junction to Sayre, 28 miles of 13,000-volt line from Gracemont to Hinton and 7 miles from Altus to Martha. A 4,500-kva., 66,000-volt substation is to be built at the Chickasha hydro plant and a 2,000-kva., 13,000-volt substation at the Chickasha steam plant.

Improved Street Lighting for National Capital.—The Commissioners of the District of Columbia have ordered that new and improved incandescent or arc lamps shall within the next year replace obsolete lights on every street in Washington within the area bounded by Pennsylvania Avenue, Eighteenth Street, M Street, Massachusetts Avenue and Sixth Street. Most of the new units will be incandescent lamps, but the more important streets, such as E, F, G, New York Avenue, Ninth, Tenth, Eleventh, Twelfth and Thirteenth Streets between Pennsylvania and New York Avenues, and Seventh and Fourteenth Streets, will get arc lights.

Virginia Retail Merchants to Study Lighting.—A large portable show window completely equipped for the demonstration of almost every lighting effect that can be used to display goods will form a conspicuous feature of a convention of the Retail Merchants' Association of Virginia to be held at Virginia Beach on June 20-22. S. G. Hibben, manager of the commercial engineering department of the West-

inghouse Lamp Company, will be in charge. The grounds of the hotel where the convention will be held are to be lighted by a 10,000-watt lamp provided by the Westinghouse company and the Virginia Electric & Power Company.

Uniform System of Accounts Ordered for All New York Electrical Corporations.—The New York Public Service Commission has ordered every electrical corporation in the state after Jan. 1, 1928, to keep its records and accounts in conformity with the approved uniform system of accounts, thus extending a previous order which applied only to corporations having average operating revenues of more than $10,000 a year.

Another California Company Reduces Rates.—Following experimental rate reductions by the Southern California Edison Company and the Southern Sierras Power Company, the San Diego Consolidated Gas & Electric Company has, as the result of an informal conference with the Railroad Commission of California at San Francisco, reduced rates substantially, and 50,000 electric lighting customers served by that company will in consequence save over $200,000 per annum in electric lighting bills. The rate reduction will become effective as of July 1. In addition to the reduction in the general lighting schedule, the San Diego company also filed an optional lighting schedule with the commission which will benefit large users of electricity and a revision of the commercial and industrial heating schedules materially reducing the cost of both kinds of service.

Illumination to Signalize Canadian Anniversary.—Electricity will play a prominent part in the celebration of the sixtieth anniversary of the confederation of the Canadian provinces, which will occur on July 7. From the Atlantic Coast to the Pacific, powerful illuminating apparatus, installed on towers, lofty buildings and other high points, will illuminate the country for many miles around. If the recommendations of the committee are carried out in full, the towers of the government buildings at Ottawa will be floodlighted and all towns and cities will follow suit. Monuments of persons prominent in Canadian history, and especially in the forming of confederation, will also be floodlighted.

Odessa, Tex., Shares in Construction in Oil Territory.—Approximately a thousand men are employed in the construction of a new 5,000-hp. electric power plant at Odessa, Tex., and on transmission lines of the Texas Electric Service Company, which is affiliated with the Texas Power & Light Company of Dallas. Between $1,250,000 and $1,500,000 of an authorized $2,000,000 is to be spent on the power plant and other equipment in Odessa, according to estimates of M. J. McCall, division engineer. The first 2,000-hp. unit of the plant, on which work began early in May, is to be completed about July 15, and construction of the remainder of the plant to the total capacity of 5,000 hp. will follow. A wooden-pole transmission line carrying 60,000 volts is being erected out of Big Springs, by means of which the new Odessa plant will distribute power to industries and communities in the oil region.

Ogdensburg, N. Y., May Wrestle with Darkness.—The city of Ogdensburg, N. Y., was dark on two nights recently, when 98 scattered arc lights were the only units in service in the municipality, which has a population of 18,000. This situation was caused by the action of the taxpayers in voting down the lighting appropriation. As a result of a resolution passed by the City Council, the lights were turned on again, money received from the sale of the fair grounds being appropriated for that purpose. There is sufficient money on hand to light the city until January, but the Mayor points out that, according to law, the money must be spread out to light the city for a year.

Second International Coal Conference Planned.—Dr. T. S. Baker, president of the Carnegie Institute of Technology, Pittsburgh, sailed for Europe from New York on June 10 to perfect plans for the second international conference on bituminous coal, to be held in Pittsburgh some time in November, 1928. He will visit the capitals of Europe to renew contact with leading coal technologists of that continent. Before sailing Dr. Baker predicted that the new conference would eclipse in attendance and importance the highly successful first conference of last November, which drew an attendance of 1,800 delegates from fifteen countries.

Coming Meetings of Electrical and Allied Societies

American Institute of Electrical Engineers—Summer convention, Detroit, June 20-24; Pacific Coast convention, Del Monte, Cal., Sept. 13-16. F. L. Hutchinson, 36 West 39th St., New York.

American Society for Testing Materials — French Lick, Ind., June 20-24. C. L. Warwick, 1315 Spruce St., Philadelphia.

Empire State Gas and Electric Association, Commercial Section—Elmira, N. Y., June 21-22. C. H. B. Chapin, Grand Central Terminal, New York.

Northwest Electric Light and Power Association—Salt Lake City, June 21-24. C. W. Lundquist, Utah Power & Light Co., Salt Lake City.

American Society of Agricultural Engineers—University Farm, St. Paul, Minn., June 22-25. Raymond Olney, St. Joseph, Mich.

Artistic Lighting Equipment Association—Ambassador Hotel, Atlantic City, N. J., June 23-25. G. P. Rogers, 711 Graybar Bldg., New York.

North Central Division, N.E.L.A.—Lake Superior steamboats from Duluth, June 24-28. J. W. Lapham, 351 Loeb Arcade, Minneapolis.

Michigan Electric Light Association—Grand Hotel, Mackinac Island, July 5-7. Herbert Silvester, Edison Bldg., Ann Arbor, Mich.

East Central Division, N.E.L.A.—Cedar Point, Ohio,, July 12-15. D. L. Gaskill, Greenville, Ohio.

Association of Electragists International—Hotel Chase, St. Louis, Aug. 8-12. L. W. Davis, 15 W. 37th St., New York.

International Association of Municipal Electricians—Salt Lake City, Aug. 16-19. E. H. Benz, West New York, N. J.

Camp Co-operation VII—Association Island, Henderson Harbor, N. Y., Aug. 28-31. Society for Electrical Development, 420 Lexington Ave., New York.

New England Division, N.E.L.A.—New London, Conn., Sept. 12-15. Miss O. A. Bursiel, 20 Providence St., Boston.

American Society for Testing Materials Convenes on Monday.—Final announcement has been made concerning the thirtieth annual meeting of the American Society for Testing Materials, to be held at French Lick, Ind., next week. Monday afternoon and evening and Tuesday morning are reserved for committee meetings. The opening convention sessions will be held Tuesday afternoon, and sessions will continue in the morning and evening until Friday evening. The presidential address will be given on Tuesday evening. On Wednesday afternoon the second Edgar Marburg lecture will be given by Dr. George L. Clark, professor of applied chemical research and divisional director of the research laboratory of applied chemistry in the Massachusetts Institute of Technology. He will speak on "X-Rays in Industry."

Highway Lighting and Rural Service in Indiana.—Following the advocacy of a plan to light highways in Indiana so as to permit their use at night, especially for hauling freight, and with accompanying electric service to farmers along and near the roads, the cost to be divided equally between the county and the power company serving the territory, suggestion has been made that such a system be first installed on the state road between Martinsville and Bloomington, about 15 miles apart. J. B. Cronkshaw of Fort Wayne, a General Electric Company engineer and John C. Mellett, representing the Indiana Electric Light Association are among those reported to be especially interested.

Construction Under Way for Interstate Public Service Company.—The Interstate Public Service Company is erecting a large substation at Scottsburg, Ind., in order to tie in there a 66,000-volt line from its power plant at Edwardsport with a 33,000-volt line from which energy is supplied for the Indianapolis-Louisville electric railway and to points between Columbus and Jeffersonville. The company is also building a new substation at Shelbyville to tie in with the 66,000-volt line from Indianapolis to that point, thus giving Shelbyville power over two transmission lines, and a 33,000-volt line from Bloomfield to Bloomington which will connect Bloomington with the Edwardsport plant and greatly increase the power supply in the Bloomington end of the oolitic stone district.

Enlarging Farm Program in Idaho.—An enlarged program for the Idaho Committee on the Relation of Electricity to Agriculture, to be put into effect immediately, was adopted at a recent meeting of the committee. The program will include completing installation of electrical equipment on the university substation farm at Caldwell, as well as co-operation with the Lee hatcheries of Middleton in keeping records on the use of electricity in incubation. Profs. M. R. Lewis and Hobart Beresford of the experiment station reported further studies of mutual distribution companies on the Minidoka tract, progress on installation of electrical equipment at Caldwell, and the results of tests on the use of electricity in cutting silage.

Men of the Industry

W. A. Jones First Vice-President of Cities Service Company

W. A. Jones, who for the past two years has been chairman of the executive committee of Henry L. Doherty & Company, has been elected first vice-president of the Cities Service Company. Mr. Jones has been identified with the Cities Service organization since 1912. From that year until 1921 he was at Joplin, Mo., where he served as cashier, auditor, assistant secretary and treasurer of the Empire District Electric Company, the Ozark Power & Water Company, the Carthage Gas Company and the Webb City & Carterville Gas Company.

It was in 1921 that Mr. Jones became

W. A. JONES

a member of the executive committee of Henry L. Doherty & Company, with headquarters in New York. At the present time he is a director of fifty corporations, including the Cities Service Power & Light Company, the Ohio Public Service Company, the Toledo Edison Company and the Empire Gas & Fuel Company. He has long been an outstanding figure in the affairs of the National Electric Light Association, having occupied the office of treasurer and that of chairman of the Accounting National Section, and at the recent convention in Atlantic City he was elected a vice-president.

J. Dunhill, secretary and treasurer of the Federal Light & Traction Company for some years past, has been appointed a vice-president.

Frederick Krug, formerly assistant to the president of the Porto Rico Railway, Light & Power Company, has been made acting manager of that utility. Mr. Krug has been associated with the Porto Rico electrical properties since 1922.

A. G. Christie, professor of mechanical engineering at Johns Hopkins University, Baltimore, sailed for England June 11 to be engaged until October as consulting engineer to some British interests.

Jacob F. Schoellkopf, chairman of the board of directors of the Buffalo, Niagara & Eastern Power Corporation, Buffalo, returned from abroad June 13 aboard the Hamburg-American liner *Hamburg* after a sojourn of three months on the Continent.

Lucien I. Yeomans, for many years prominently identified with the engineering profession, has been placed in charge of the Chicago office of Stevens & Wood, Inc., engineers and constructors. Mr. Yeomans has devoted his time especially to coal distillation, in which field he will continue to specialize.

John E. Curtiss, formerly secretary for seven years of the Nebraska State Railway Commission, has been appointed by Governor McMullen to fill the vacancy caused by the resignation of Chairman H. G. Taylor of that body, and will take charge July 1. Mr. Curtiss severed his connection with the commission eight months ago to become a department secretary in the Lincoln Chamber of Commerce. He is a lawyer by profession.

Owen D. Young, chairman of the board of directors of the General Electric Company, was awarded the honorary degree of doctor of commercial science by New York University at the recent commencement exercises. In the formal citation for the degree Mr. Young was said to be eminent for service in the realm of industrial development, in commerce, finance and international relations.

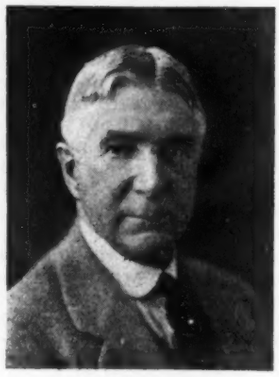
Theodore F. Merseles, president of Montgomery Ward & Company, has been made president of the Johns-Manville Corporation and will assume his new duties July 1. At that time H. E. Manville, formerly president, will become chairman of the board. Mr. Merseles was also elected a member of the board of directors. **George Whitney** and **Francis D. Bartow**, members of the firm of J. P. Morgan & Company, were also added to the directorate.

Hugh C. Thuerk, formerly manager of power sales for the northwestern region of the Penn Public System, has been appointed operating manager of the Erie Lighting Company and the Home Heating Company. These companies furnish electric and steam service in Erie, Pa., and adjacent territory. After graduation from Purdue University in 1919, Mr. Thuerk became merchandising manager for the Olean (N. Y.) Electric Light & Power Company. In 1921 he moved to Ridgway, Pa., where he served as commercial manager for the Keystone Power Corporation until the fall of 1923. At that time he became affiliated with the Penn Public System, now a part of the Associated Gas & Electric System, at Erie, as special engineer, and he was appointed manager of power sales in March, 1926. Mr. Thuerk is a member of the competitive power committee of the N.E.L.A. He has been active in committee work of the Pennsylvania Electric Association and served as chairman of the state power committee in 1926.

H. F. T. Erben to Retire

H. F. T. Erben, assistant vice-president of the manufacturing department of the General Electric Company, who will retire at the end of the year, as announced in the May 28 issue of the ELECTRICAL WORLD, has been affiliated with the General Electric organization since its early beginnings at Schenectady. He started as an employee of the Edison Machine Works in the fall of 1887. Following the growth of the company and the subsequent development of the plant, he was made designing engineer of the direct-current department soon after the formation of the General Electric Company in 1892.

Mr. Erben advanced consistently, and in 1914 he became an engineer at the Schenectady works. It was not long before he was performing the duties of assistant manager of the works. A promotion to the position of works manager followed in June, 1920, which



H. F. T. ERBEN

post he held until 1923, when he became vice-chairman of the manufacturing committee. It was in 1924 that he was named assistant vice-president.

Gerard Swope, president of the General Electric Company, was awarded the honorary degree of doctor of science by Colgate University at the commencement exercises held June 13. At the same time his brother, Herbert Bayard Swope, executive editor of the New York *World*, was awarded the honorary degree of doctor of literature.

A. M. Ferguson, formerly manager of the Utah Power & Light Company's Salt Lake division, has assumed new duties in the general offices of the company as assistant to Commercial Manager P. M. Parry. Mr. Ferguson's activities in the public utility field have covered a wide scope. After being graduated as a mechanical engineer from Cornell University in 1903, he was assigned to the engineering staff of the Westinghouse Electric & Manufacturing Company, being in charge of erecting central stations for that company, chiefly in the West and Northwest. In 1908 he became identified with properties of the late Senator W. A. Clark in western Montana, with headquarters at Missoula, where he was engaged in the construction and operation of water-power plants and steam-heating systems, later entering the commercial fields of the business. In October, 1916, he left the Clark properties and became

associated with the Utah Power & Light Company in charge of installing and operating the company's steam-heating system, which serves Salt Lake City's business section. In February, 1919, he was promoted to the position of manager of the company's Salt Lake division, retaining his responsibility in connection with the steam-heat department.

Paul L. Morgan, general manager of the Jersey Central Power & Light Company for the North Jersey territory, has resigned to become personal representative of A. E. Fitkin, public utility operator, who heads the Inland Power & Light Company, which has headquarters at St. Louis.

A. K. Warren, who has been connected with the West Lynn works of the General Electric Company as managing engineer, has returned to Japan to continue his work of consulting engineer for the Shibaura Engineering Works, Ltd., Tsurumi Works, Tsurumi-machi, Kanagawaken, Japan.

Charles A. Tattersall, assistant to the president of the Niagara Falls Power Company, has been promoted to be assistant to Paul A. Schoellkopf, president of the Buffalo, Niagara & Eastern Power Corporation. Mr. Tattersall entered the employ of the Niagara company at Niagara Falls, N. Y., nineteen years ago.

David H. Couch, combustion engineer with the Narragansett Electric Lighting Company, Providence, R. I., has severed his connection with that utility to affiliate himself with the Combustion Engineering Corporation of New York. Mr. Couch has been affiliated with the Narragansett Electric Lighting Company since July 1, 1920.

Elmer A. Shrider, vice-president and general manager of the Ohio Electric Power Company, Sidney, Ohio, subsidiary of the National Electric Power Company, has resigned to become general manager of the Central States Edison Company, with offices in Chicago. Mr. Shrider has been in Sidney nearly eight years and was formerly with the Albert Emanuel Company.

W. D. Wilkinson has assumed his new duties as engineer in the commercial department of the New England Power Company with headquarters at Worcester, Mass. Mr. Wilkinson had been connected with the Utica (N. Y.) Gas & Electric Company since 1920 as superintendent of the meter and testing departments and later as electrical engineer.

Joseph R. English has been appointed sales manager in charge of all new-business activities of the northwest region of the Penn Public System, now a part of the Associated Gas & Electric System, with headquarters at Erie, Pa. He was formerly commercial manager in charge of lighting and commercial sales. Mr. English has been with the Erie Lighting Company since 1918. He first served as assistant superintendent and later was put in charge of the new-business activities.

A. P. Merrill, formerly manager of the Ogden division of the Utah Power & Light Company, has been appointed manager of the Salt Lake division, to succeed H. M. Ferguson, who has assumed new duties. Mr. Merrill has been a prominent figure in engineering activities in several sections of Utah and has done much pioneering work along this line.

Francis J. Brett, assistant treasurer of the Buffalo, Niagara & Eastern Power Corporation, has been elected treasurer to succeed Mr. Mann. Mr. Brett has been connected with the power industry of the Niagara frontier for nineteen years. He started with the Niagara Falls Power Company as an office boy in 1908. Since then he has successively filled the positions of payroll clerk, bookkeeper, accountant, auditor and assistant treasurer in associated companies. In 1925 he became assistant treasurer of the Buffalo, Niagara & Eastern Power Corporation.

Howard A. Lewis, vice-president of the Electric Refrigeration Corporation, has returned to the United States after spending six months studying foreign markets. Mr. Lewis has been for many years an outstanding figure in the field of electric appliance distribution.

Obituary

James Kynoch, Canadian electrical engineer, died at Simcoe, Ontario, on June 1, in his sixty-first year. He had suffered from heart trouble for some years and had gone to Simcoe to recuperate. In 1892 Mr. Kynoch became connected with the engineering department of the Canadian General Electric Company, then just formed, and fifteen years ago was promoted to be chief engineer of that organization.

K. B. Hunter, superintendent of maintenance of the Central Indiana Power Company, was killed May 29 as the result of a fall at the Clinton (Ind.) plant of the company. Mr. Hunter was engaged in supervising repair work following damage done in the recent storm area and was on a steel substation when he fell. He suffered a fractured skull and died instantly. He was 53 years of age.

Paul T. Kamerer, superintendent of the meter division of the West Penn Power Company, Connellsville, Pa., died of pneumonia April 20. Mr. Kamerer was born at Greensburg, Pa., and was graduated from Pennsylvania State College in 1906 with an E.E. degree. He then took an apprentice course with the Westinghouse Electric & Manufacturing Company at East Pittsburgh and at the Newark works, subsequently becoming an instrument expert in erecting work.

Russell Herder, assistant sales manager of the Mitchell-Rand Manufacturing Company, New York, died suddenly of heart disease May 29. He was born in Brooklyn in 1876, but for several years had been a resident of Cedar Grove, N. J.

John Byron Taylor, 58, prominently identified with the beginnings of the Northern New York Utilities, Inc., and a prominent business man in northern New York, died suddenly at his New York home on Sunday, June 5. Born at Three-Mile Bay, Jefferson County, N. Y., Mr. Taylor was first associated with his brothers in the boot and shoe business in Watertown. Later he became interested in public utilities.

David Guthrie, one of the pioneers in electrical development in Nebraska, died at Superior, Neb., June 2. In 1914, after years of business experience as a miller employing steam and water power, he purchased the Superior Electric Light Company from Rufus E. Lee of Omaha and operated it as the Southern Nebraska Power Company. He disposed of his interests to the United Light & Power Company of Abilene, Kan., and had been in retirement for several years. He had been a legislator, mayor of his home city and active in business and civic interests.

Henry H. Curtis, treasurer of the C. & P. Electric Works, Springfield, Mass., and a member of the American Institute of Electrical Engineers, died suddenly April 21. Though a native of Bowdoinham, Me., Mr. Curtis spent most of his early life in Iowa, but he returned East in 1880 and had been associated with the electrical industry ever since. He was identified with the Thomson-Houston Electric Company, the Mather Electric Company, Manchester, N. H., and the Davis Electric Manufacturing Company at Springfield before organizing the C. & P. Electric Works, Inc., which he owned and managed up to the time of his death.

Louis C. Brooks, electrical engineer, died suddenly April 18 at his home, Groton, Mass. During his career as an electrical engineer Mr. Brooks devoted himself especially to electricity as applied to marine work. He was for some time affiliated with the General Electric Company and spent a long period of service in marine work for the United States government. From 1918 to 1926 he was electrical engineer for the Bethlehem Shipbuilding Corporation, Ltd., at Bethlehem, Pa., and Quincy, Mass., resigning to take up work in the country, hoping to regain his failing health. Mr. Brooks was active in the American Institute of Electrical Engineers, having been chairman of the committee on applications to marine work for two years (1924-1926) and a member of the committee on meetings and papers.

James Leslie Harvey, a member of the commercial department of the Electric Bond & Share Company, New York, died suddenly from a cerebral hemorrhage. May 25 at his home in Salina, Kan. Mr. Harvey was born in Salina and was a graduate of Kansas University in electrical engineering. After leaving that institution he went through the testing department of the General Electric Company and became its representative with headquarters in Wichita, Kan., resigning that position on Feb. 15, 1920, to become general commercial manager of the Kansas Gas & Electric Company. His success in promoting the commercial side of that company's business was so outstanding that it attracted the attention of the Electric Bond & Share Company in New York City, by which organization he was employed on July 1, 1924, remaining there until his death. Mr. Harvey was recognized throughout the United States as one of the outstanding commercial men in the electric light and power industry.

Recent Court Decisions

Federal Supreme Court Upholds Wisconsin's Water-Power Law.—The constitutionality of the recapture clause of the Wisconsin water-power law, under which the state or a political subdivision thereof has the right to take over licensed private water-power properties at the expiration of 30 years at a price to be fixed by the State Railroad Commission, has been upheld by the United States Supreme Court in the appeal of the Fox River Paper Company and others against the Railroad Commission. (See ELECTRICAL WORLD for April 17, 1926, page 834.) The plaintiffs in this case claim to be riparian owners of land on the Fox River and own a dam at Appleton which was constructed in 1878 without the consent of any state authority. In 1925 the Wisconsin Legislature passed a law requiring operators of power dams to apply for a permit and stipulating conditions. The Fox River Paper Company and its associates applied for a permit but omitted the recapture agreement prescribed in the law, and a suit resulted. The Wisconsin Supreme Court upheld the law, and this decision is now affirmed by the United States Supreme Court, which points out the sovereignty of a state over navigable streams, subject only to the higher authority of the federal government, and asserts that should a dam be desired by the state or one of its political subdivisions, the question of a fair price could be carried to the courts in the event that the operations of the Wisconsin law as to price were not considered just. The plaintiffs declared the law to be confiscatory.

Power of New York Commission Over Rates Fixed in Franchise Agreements.—The New York Supreme Court, Appellate Division, has upset (in United Traction Company vs. Public Service Commission) a determination of the commission to the effect "that the Legislature has revoked the power to regulate rates fixed in franchise agreements by the repeal of the statute conferring it, and that the Public Service Commission has no jurisdiction now to exercise such delegated authority." The petitioner contended that all its franchise rates had been converted into statutory rates and that therefore the commission had jurisdiction. Interpreting the repealing statute, the court said: "The reasonable, if not the necessary, implication was that the Legislature referred to franchise conditions, consents or agreements which at the time of contemplated action by the commission would be binding agreements. The mere fact that they had previously existed would be of no importance, if they had been waived or had been superseded by later agreement or statute. In such cases the commission already had jurisdiction and has it today. . . . Assuming, however, that we have not properly interpreted the legislative intent in our analysis thus far, we think that the determination of the commission in this case must be annulled for the reason that Troy and Rensselaer franchise agreements containing fare provisions were superseded prior to the order of the commission of June 28, 1922. They are not binding agreements which interfere with the present jurisdiction of the commission, irrespective of that order. Chapter 358 of the Laws of 1905, the effect of which has been fully set forth in the statement of facts herein, clearly superseded the Rensselaer franchise agreements, and it has been so held." (219 N. Y. S. 421.)*

Interstate Business and Commission Regulation.—The decision of the United States Circuit Court of Appeals for Arizona that the Southern Sierras Power Company of California is not entitled to an injunction to restrain the Arizona Edison Company from generating its own electrical energy or purchasing it from others† will stand, the United States Supreme Court having refused to grant a writ of certiorari to review the case. If the Southern Sierras Company is injured, it must seek relief by other court means, the Circuit Court having held merely that the procedure was wrong. The case involved commission regulation where interstate service is concerned. The Southern Sierras company sought an injunction to prevent the Arizona company from building its own plant to supply electricity at Yuma, Ariz., or from purchasing power from the United States government at the Syphon Drop power plant, alleging that the Arizona company had a contract to purchase power from the Southern Sierras which had six years yet to run. The Arizona company alleged that service by the Southern Sierras company was unsatisfactory and brought forward a decision from the Arizona Corporation Commission to this effect and in which the Arizona company was required at the earliest possible date to provide a continuous and adequate supply of electrical energy to its consumers in Yuma. The appellee contended that the order of the Arizona commission, if construed as prohibiting the performance of the contract, was void, for the reason that the contract was to be performed in the State of California and the jurisdiction of the commission did not extend to service rendered by the appellee in that state. The Circuit Court pointed out that the jurisdiction of the commission extended nevertheless to the appellant and controlled its action, maintaining that the said order, and the commission's possible future orders to the appellant, only added to the complications which conflicted with the power of a court of equity to supervise and direct the continuous performance of the contract. The Supreme Court's refusal to review the case sustains this view and leaves to the Southern Sierras Power Company as its remedy only a suit for damages for breach of contract.

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

†This decision (17 Fed. (2d) 739) was noted in this column on March 26 (page 679), when the Southern Sierras Power Company was referred to as a Wyoming corporation, the company having been incorporated in that state.

Commission Rulings

Transmission Line on Indian Reservation.—The Niagara, Lockport & Ontario Power Company has been authorized by the New York Public Service Commission to construct a transmission line on the reservation of the Seneca Indians. The right was acquired by contract with the Indian nation and provided for the protection of individual Indians by incorporating therein provisions requiring the petitioner to satisfy any special damages which might be suffered by any individual Indian by the construction or operation of the line. The commission held it had no power to determine the company's right to cross the land of individual Indian allottees without their consent.

Rates in One Town Supplied by Another Must Be Separately Regulated.—The Indiana Public Service Commission has disapproved a provision of a contract by which the city of Frankfort was to supply electricity to the inhabitants of the town of Thorntown at a specified rate to the effect that any increase or decrease in the rate for Frankfort should apply automatically in Thorntown. The commission held that this would not be good business practice for Frankfort, which was not only to furnish the energy but also to construct a transmission line of 14 miles and rehabilitate the distribution system in Thorntown, with a probable line loss of 25 per cent, on the rates provided. It would not be economical for Frankfort to lower or raise the rate as proposed, since Frankfort consumes very much more electricity than Thorntown and the arrangement would impose an additional burden on the consumers in Frankfort and create discrimination.

Various Considerations in Valuation for Rates Cited by New York Commission.—In arriving at a rate base for the Plattsburg Gas & Electric Company the New York Public Service Commission made the following stipulations and observations: Consideration of the element of reproduction cost less depreciation must be actually shown in the valuation figures which are finally arrived at, but the commission has a reasonable and proper latitude for the exercise of its informed judgment. Provision for six weeks' operating expenses is sufficient cash working capital for a utility company whose bills are rendered monthly, the greater portion being paid within ten days thereafter. In valuing water rights consideration was given to the utilization factor in conjunction with flow data averaged upon statistics for a certain number of years. The city used a utilization factor of 66⅔ per cent and sixteen years' data; the company used 80 per cent and ten years; the commission adopted 70 per cent utilization as fair. Only half the full present-day value of standby equipment was included, since it was probable that energy could be purchased for a number of years at a reasonable price.

Financial and Statistical

Stocks Again Withstand Break
Average Prices Recede Slightly
Bond Issues Undigested

THE violent selling movement which broke prices down ten and twelve points on the New York Stock Exchange and created heavy selling all along the line early this week lowered the average of listed power and light common stocks by barely one and one-fortieth points. The largest loss, one of two and seven-eighths points, was recovered in a few hours' trading. Selling did not exceed a few thousand shares in any issue. Much the same thing happened on the curb market, where the utilities were the strong points. Although the situation has been similar in virtually all the recent market breaks, this is probably the best illustration that has occurred recently of the stability of utility securities. The speculative element in the market has left these issues practically alone up to the present.

During the week utility stock averages have receded slightly from the high point of the year reached last week. The power and light common stock index computed by the ELECTRICAL WORLD dropped from 108 to 106 this week against 95 at the beginning of the year and 91 for this week last year. This steady upward movement resulting from bettered position and increased earning power of the companies contrasts with the speculative strides made by other sections of the market.

Bond issues have evidently been offered in rather too large volume in relation to price. Several issues, including two large utility issues, are said to be only partially absorbed by the investing public. This has naturally affected the entire bond market.

New Capital Issues

During the week ended June 16 the Cities Service Power & Light Company issued 75,000 shares of six-dollar-dividend cumulative preferred stock at $92.75 per share, to yield about 6.47 per cent.

Another substantial stock issue was offered by the International Paper Company in the form of cumulative 7 per cent preferred stock amounting to $15,000,000. The stock included in this offering, priced at $99 per share, was issued in connection with the acquisition of the Louisiana Pulp & Paper Company properties and 160,500 common shares of New England Power Association.

A new offering was made by the Ohio Electric Power Company in the form of first mortgage 5 per cent gold bonds, totaling $2,100,000, the price being 96 and accrued interest, to yield over 5.25 per cent. These bonds, dated June 1, 1927, and maturing June 1, 1957, are secured by a direct first mortgage on all the fixed property of the company. Proceeds of these bonds will be used to provide in part for the retirement of all bonds at present outstanding against the property of the company which bear interest rates higher than that of this series of first mortgage gold bonds, and in part for the reimbursement of its treasury for moneys expended for the acquisition of properties.

The Midland Counties Public Service Corporation made an offering of first mortgage thirty-year 5 per cent gold bonds, series A, amounting to $2,500,000, at 96¾ and accrued interest, to yield more than 5.20 per cent. The proceeds of this issue will be used to reimburse the corporation's treasury for funds expended for the redemption of all previously outstanding bonds and for expenditures for additions, extensions or improvements to its system.

Voting Trust New England's Weapon to Thwart Absentee Ownership

Aggressive Attempts of Outside Interests to Acquire Control of Utility Properties Lead to Defensive Action

WHO will be the future owners of those New England public utilities still operating as individual units? Whether the dominant interest will remain local or pass to outside power groups has become an issue of cardinal importance throughout New England. Many think the outcome will depend upon the ability of local directorates to perpetuate present ownership by such means as the formation of voting trusts—a development which is now a leading subject of interest among utility executives and shareholders in the Northeast. In many cases present managements are wondering what their future status will be in the event of a change of control.

So sincere has become the desire to thwart the "peaceful penetration" of these outside interests that drastic steps are being taken. In one case the directors of an old New England power and light company were summoned from their homes to a directors' meeting at an hour approaching midnight to assemble sufficient stock to retain control. As it proved, one day longer would have been too late. Less dramatic, though equally urgent, occurrences of a similar nature have become commonplace. Of course, this display of interest in New England properties did not develop overnight, but the buying activities of certain of the larger groups seem to have been the signal for a more or less concerted buying movement during the past few weeks.

Two questions naturally arise: Why are the power groups seeking new properties, and why is New England especially favored? It is of course probable that each group seeking new fields of operation has a distinct purpose in mind in turning to New England. One group, for example, has a large number of relatively small properties in various parts of the country and is said to de-

OUTSIDE GROUPS

Middle West Utilities Company:
- New England Public Service Company Comprising:
  - Central Main Power Company.
  - Public Service Company of New Hampshire.
  - Public Service Company of Vermont.
  - Cumberland County Power & Light Company of Portland, Me.
  - Part interest Twin State Gas & Electric Company (Vermont and New Hampshire).

United Gas Improvement Company:
- Connecticut Electric Service Company of Hartford.
- Connecticut Light & Power Company.
- Meriden Electric Light Company.
- Eastern Connecticut Power Company.
- Meriden Gas Light Company.

Associated Gas & Electric Company:
- Portsmouth Power Company.
- Cape & Vineyard Electric Company.
- Cambridge Electric Light Company.
- Cambridge Gas Company.
- (Worcester Gas Light Company) (Case before commission).

Pierce Interests, Chicago:
- Maine & New Brunswick Power Company.

H. L. Doherty & Company:
- Danbury & Bethel Gas Company.

W. B. Foshay & Company:
- Clyde River Power Company.
- Newport Electric Light Company (Vermont).

NEW ENGLAND GROUPS

New England Power Association:
- New England Power Company.
- Narragansett Electric Light Company.
- United Street Railways Company of Rhode Island.
- Lawrence Electric Light Company.
- Gardner Electric Light Company.
- Grafton County Electric Light Company (New Hampshire).

North Boston Lighting Properties (Charles H. Tenney & Company):
- Malden Electric Company.
- Suburban Gas & Electric Company of Revere.
- Beverly Gas & Electric Company.
- Salem Electric Lighting Company.
- (To add Haverhill and Newburyport electric companies).

Western Massachusetts Companies:
- Turners Falls Power & Electric Company.
- Pittsfield Electric Company.
- Easthampton Gas Company.
- Amherst Gas Company.
- Agawam Electric Company.
- Greenfield Electric Light & Power Company.

sire a few attractive units of the New England type to round out its holdings and facilitate future borrowing. Another holding company recently liquidated its entire holdings and is seeking new fields of operation.

WHY NEW ENGLAND PROPERTIES?

But there are, also, specific reasons arising out of the character and operating conditions of New England properties. New England utilities have always been conservatively financed—frequently without resort to borrowing. Many of them are considered by outsiders to be undervalued. The utility commissions of Massachusetts and neighboring states have held to the so-called "prudent investment" theory of value as opposed to the "reproduction-cost - less - depreciation theory." The spread between estimated values based on the two theories is sometimes exceedingly wide. One property valued at $9,000,000 on the New England basis is estimated at nearly $20,000,000 under the "reproduction cost" theory. The Supreme Court's decision in the Indianapolis Water Company case—interpreted as leaning toward the reproduction-cost theory—may, it is thought, have an important bearing on future policy. Should this be the case, many properties would be enabled to earn much higher returns on a higher valuation. Whether or not higher rates to produce these higher yields would be feasible is another question. Company executives in New England express the opinion that such a policy not only would limit consumption and thus defeat its own purpose, but would be exceedingly damaging to present favorable public relations. In any event the present drive for reduced rates in a score of New England centers and the Worcester decision do not lend much promise to the suggestion. This, however, is more or less beside the question. There is still room for interconnection in many parts of New England; public relations, as intimated, are generally satisfactory, and the outlook for New England companies is unusually favorable from many angles.

That this is the judgment of responsible leaders of the industry is seen from the accompanying list of participants in the buying movement. In some cases three and four offers have been made for strategic properties. For the most part, however, the different companies have purchased in different sections. Sometimes representatives were sent direct to make an offer to the companies concerned. In other cases buying of outstanding stock was carried on secretly in an attempt to acquire a majority before suspicion should be aroused. Occasionally independent agents sought to buy for quick profits.

Regardless of what was the purpose of the buying movement or the method adopted by the various interests involved, increased demand had the inevitable effect of boosting security prices as well as those asked and received for individual properties. Stocks of such companies as Central Maine Power, Keene Gas & Electric and Combridge Electric Light experienced phenomenal advances in price. Properties have been acquired at prices which appear out of line with current earning power, and doubts are expressed concerning the ability of some of these to earn dividends on the basis of prices paid. The buying is not, of course, confined to outside interests. Several New England groups also have recently acquired many additional properties. The voting-trust movement, however, details of which will be discussed in the next issue, seems to be directed, largely, against the transfer of control and ownership to interests outside New England.

A list of outside and local companies which recently made purchases of New England properties will be found on page 1351.

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday June 14	Low 1927	High 1927
ABITIBI PWR. & PAPER, 4% com.—no par	93¼	83	97¼
Adirondack Pwr. & Lt.—7% pf.	110½	107	111½
Adirondack Pwr. & Lt.—8% pf.	115	112	115
Ala. Pwr., $7 cum. pf.—no par	113	107	112½
Allis-Chalmers Mfg., 7% pf.	k111½	109	112½
Allis-Chalmers Mfg., 6% com.	107	88	111½
Aluminum Co. of Amer., com.	80	67¼	81½
Aluminum Co. of Amer., 6% pf.	k104½	101¼	104½
Amer. & Foreign Pwr., pf. 25% pd.	m110	....	....
Amer. & Foreign Pwr., 7% pf.—no par	100	86½	101½
Amer. & Foreign Pwr., com.—no par.	23	18¾	25½
Amer. Bosch Magneto, com.—no par	14	13	18½
Amer. Brown Boveri Elec†	16¼	16	39½
Amer. Brown Boveri Elec., pf. $7	65	65	98
Amer. Gas & Elec., 6% pf.—no par	103	95½	101½
Amer. Gas & Elec., com.†—no par	87	68½	100½
Amer. Lt. & Trac., 6% pf.	115	112	120
Amer. Lt. & Trac., com.†	258	222	265
Amer. Pwr. & Lt., 6% pf.	104½	97¼	106½
Amer. Pwr. & Lt., com.†—no par	63¼	54	67
Amer. Pub. Serv., 7% pf.	k101	95	99½
Amer. Pub. Serv., com.†	65	....	....
Amer. Pub. Utilities, 7% ptc. pf.	k 87	73	88
Amer. Pub. Utilities, 7% pr. pf.	k 95½	88	93
Amer. Pub. Utilities, com.	57	65	70
Amer. States Sec., A	3	2¼	4½
Amer. States Sec., B	2½	2¼	4½
Amer. Superpwr., 6% ptc. pf.—25	k 29¼	26¼	29½
Amer. Superpwr., 6% 1st pf.	l 97	....	....
Amer. Superpwr., Class A†—no par	38¼	27½	38½
Amer. Superpwr., Class B†—no par	39¼	28¼	39½
Amer. Wtr. Wks. & Elec., 7% pf.	109½	105	110½
Amer. W. W. & E., com. $1.60—20	91½	62½	98
Anaconda Copper 2d $3	45	45	49½
Appalachian Electric Pwr., 7% 2d pf.	100	100	105
Appalachian Elec. Pwr., 2nd pf., 7%	104½	100	102
Appalachian Elec. Pwr., com.	m78	....	....
Arizona Pwr., 7% pf.	83	77	84½
Arizona Pwr., com.	24	22	37½
Arkansas Pwr. & Lt. 7% pf.	103¼	....	....
Assoc. Gas & Elec., $3.50—50	51	....	....
Assoc. Gas & Elec., pf.—$6—no par	92	85	93
Assoc. G.&E., Class A, 10—no par	41½	35	43
BABCOCK & WILCOX, 7% com.	119	115½	124
Binghamton L., H. & P., $6 pf.	97	93	98
Birmingham Elec., pf.—$7—no par	108½	105	109
Blackstone Valley G. & E., 6% pf.	106	103	105
Blackstone Valley Gas & Elec., 10% com.—50	135	98	154½
Blaw-Knox, com.†	m 70	70	73
Brazilian Trac., Lt. & pwr., com.†	f168½	....	....
Broad River Pwr., 7% pf.	100	97	100
Brooklyn Edison, 8% com.	167	148½	176
Buffalo, Niagara & East. Pwr., $1.60 pf.—25	l 25½	....	....
Buffalo, Niagara & East. Pwr. com. $1—no par	l 31½	....	....
CALIFORNIA ELEC. GENERATING, 6% pf.	97½	96	99½
California Ry. & Pwr., 7% pf.	135	125	150
Carolina Pwr. & Lt., pf.—$7—no par	l109½	107	108½
Central & S.W. Util., $7 pf.—no par	a 97	93¼	97¼
Central & S.W. Util., pr.in.$7 pf.—no par	a100	98½	103
Central Ariz. Lt. & Pwr., 8% pf.	k 97	95	98
Central Ark. Ry. & Lt., 7% pf.	102	100	104
Central Ill. Pub. Serv., $6 pf.	k 90½	88	91
Central Ind. Pwr., 7% pf.	91	86	95
Central Pwr. & Lt., 7% pf.	101	100½	103
Central States Elec., 7% pf.	97	92½	98
Central States Elec., com.†	m200	....	....
Century Elec., 6% com.	m115	115	115
Chicago Fuse Mfg., com.—$2.50 no par	m 35	30	35
Cincinnati Gas & Elec., 5% com.	g 96½	96½	97½
Cities Service, 6% pf.	l 89½	88½	92½
Cities Service, pf. B—10	l 8½	8	8½
Cities Service, pf. BB—100	l 82½	80½	85
Cities Service, com.—20	l 46½	40½	58½
Cities Service, Bks. Shrs.—10	l 23½	22½	29½
Clarion River Pwr., 8% pf.	95	....	....
Cleveland Elec. Illg., 6% pf.	110½	108	110
Cleveland Elec. Illg., 10% com.	298	302	310
Columbia Gas & Elec., 6% pf.	106	99½	107½
Columbia G. & E. com. $5—no par	94½	82½	98½
Columbia Ry., Gas & Elec., 6% pf.	m 94	....	....
Columbus Elec. & Pwr., $2 com.—no par	64	....	....
Columbus Ry., Pwr. & Lt., 6% 1st pf.	102½	98½	102½
Columbus Ry., Pwr. & Lt., 6½% pf. B	102	96	103½
Columbus Ry., P. & L., com.—no par	70	75	79
Commonwealth Edison, 8% com.	a153½	138	155
Commonwealth Pwr., 6% pf.	k 99½	91½	98
Commonw'th Pwr., $2, com.—no par	51½	48½	54½
Conn. Lt. & Pwr., 8% pf.	k120	119	123
Conn. Lt. & Pwr., 7% pf.	k113	112	113½
Cons. Gas of N. Y., pf.†—50	k 56½	55½	62
Cons. Gas of N. Y., com $5—no par	104½	94	109½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6% pf.	k105	105	107
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6½% pf.	e112	110½	112½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 7% pf.	e114½	112½	115½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 8% pf.	e128½	126	129
Cons. Gas, Elec. Lt. & Pwr. of Balti., com. $2.50—no par	e 58½	51	59½
Consolidated Pwr. & Lt., 7% pf.	k103	100	103
Consumers Pwr., 6% pf.	103½	100	102
Consumers Pwr., 6.6% pf.	105	103	105½
Continental Gas & Elec., 8% pfc. pf.	106	103	106½
Continental Gas & Elec., 7% pr. pf.	101	100	103
Conti. G. & E. com. $4.40—no par	k210	210	225
Crocker Wheeler, com.†	31	....	....
Crocker Wheeler, 7% pf.	84	....	....
DALLAS PWR. & LT., 7% pf.	109	107	109½
Dayton Pwr. & Lt., 6% pf.	k105½	101	103
Detroit Edison, 8% com.	148	133½	157
Dubilier Condenser, com.—no par	k 4½	3½	5½
Duquesne Lt., 7% pf.	115½	114½	116½
EASTERN NEW YORK UTIL., $7 pf.	105	102	104½
Eastern New York Util. com.	65	70	75
Eastern States Pwr., $7, com.	9	9	13
Eastern States Pwr., pf.	88	90	95
East. Tex. Elec., 7% pf.	107	106	108
Edison Elec. of Boston, $12 com.	d252	217	267
El Paso Elec., 7% pf.	108	105	107½
Elec. Bond & Share, 6% pf.	l108½	105½	109½
Elec. Bd. & Sh. Sec., com. $1—no par	l 72	67½	76
Electric Household Util.†	a 13¼	11	15½
Elec. Investors, 6% pf.—no par	95	92	96
Elec. Investors, com.†—no par	38¼	32½	40½
Elec. Investors, 10% pd. receipts	m 15	....	....
Elec. Pwr. & Lt., ctfs. pf.	k106½	96	106½
Elec. Pwr. & Lt., ctfs., 40% pd.	k115	103½	115
Elec. Pwr. & Lt., ctfs, full pd.	m114	108½	111½
Elec. Pwr. & Lt., ctfs., com.—no par.	21½	16½	23½
Elec. Refrig. cap.†	21½	19½	37½
Elec. Ry. Securities, com.—no par	k 7½	6	8
Elec. St. Battery com. $5.25—no par	68	63½	79½
Elmira Wtr., Lt. & R.R., 7% pf.	102	99	101½
Emerson Elec., pf.	m111	108½	111
Empire Pwr., pfc.†	33¾	26	38½
Engr. Pub. Serv., $7 pf.—no par	104	93½	106½
Engr. Pub. Serv., com.—no par	27	21½	28½
Eureka Vacuum Cleaner, com. $4—no par	72	60½	74
FAIRBANKS MORSE, 7% pf.	k110	107½	112
F.-M., com.—$3—no par	39	37½	43½
Federal Lt. & Trac., com. $1.40	41½	37½	47
Federal Lt. & Trac., $6 pf.—no par	98	91½	99½
Ft. Worth Pwr. & Lt., 7% pf.	l111	108	112
GALVESTON-HOUSTON ELEC. 6% pf.	74	68	72
Galveston-Houston Elec., com.	28	22	30½
Gen. Elec., $3 com.—no par	104½	81	108½
Gen. Elec., special—6%	11½	11½	11½
Gen. Gas & Elec. (Del.) com. A. $1.50—no par	39	34	47½
Gen. G.&E. (Del.) com. B—no par	41	35½	43½
Gen. G.&E. (Del.) pf. A. $8—no par	k117	113½	120
Gen. G.&E. (Del.) pf. A. $7—no par	k106½	100	109½
Gen G.& E. (Del.) pf. B $7	k102	96	104½
Gen. Pub. Serv., $7 conv. pf., no par	k107½	102	106
Gen. Pub. Serv., com., no par	14½	11½	15½
Ga. Lt., Pwr. & Rys., 6% pf.	93	87	92
Ga. Lt., Pwr., & Rys., com.	m 60	....	....
Ga. Ry. & Pwr., 8% pf.	k123	119	123
Ga. Ry. & Pwr., 7% pf.	112½	106	110
Gt. Western Pwr., 7% pf.	k102½	....	....
IDAHO PWR., 7% pf.	107	103	105
Ill. No. Utilities, 6% pf.	k 88	88	92
Ill. Pwr. & Lt., 7% pf.	100	99	101
Ingersoll Rand com. $8	k 90	89½	96½
Int. Combus. Engr., com. $2—no par	45½	43½	64
Int. Util., Class A—$3.50—no par	41	28	41
Int. Utilities, Class B—no par	7½	3	7½
Interstate Pwr., pf.—$7—no par	95½	93	98
Interstate Pub. Serv., 7% pf.	100	98	99½
Iowa Ry. & Lt., 7% pf.	98	97	99
JERSEY CENTRAL PWR. & LT. CO., 7% pf.	101½	97½	103
Johns-Manville, com.†—no par	78¼	55½	86

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid price Saturday, June 11. *l*Bid price Wednesday, June 15. *m*Latest quotations available. †Dividend rate variable.

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday June 14	Low 1927	High 1927
KANSAS CITY PWR. & LT. pf.$7	k115	112	115½
Kansas Gas & Elec., 7% pf. ex. div.	l106	103	107
Kentucky Hydro-Elec., 7% pf.	a 95½	94½	97½
Kentucky Sec.,6% pf.	k 86	83	87
Kentucky Sec., 5% com.	109½	110	115
Kentucky Utilities, 6% pf.	98½	95	98½
Keystone Pwr. & Lt., 7% pf.	98	96	98½
LACLEDE GAS LT., 12% com.	245½	173½	267½
Lehigh Pwr. Sec., com.—no par	18½	15	20
Long Island Ltg., 7% pf.	111½	107½	112
Long Island Ltg., com.†—no par	144	139	153
Los Angeles Gas & Elec., 6% pf.	99	98	100½
Louisville Gas & Elec., cl. A. $1.75	26½	23½	27½
MAN. ELEC. SUPPLY, cap. $5 —no par	72½	53½	75½
Manila Elec., com.†—no par	k 43½	40	46
Maytag Mfg., com. .50—no par	27½	23½	32½
Memphis P. & L., pf.—$7—no par	108½	107	109
Metropolitan Ed., pf.—$6—no par	99½	93	100
Metropolitan Ed., pf.—$7—no par	107	104	108
Metropolitan Ed., com. $5—no par	60	....	....
Middle West Utilities, 7% pf.	a110½	105½	113½
Middle West Util., 8% pr. lien	a120½	117½	122½
Middle West Util., com. $6—no par	a112½	108	117½
Midland Utilities, pr. ln. 7% pf.	a105	98	105
Midland Utilities, 7% pf. A	a102	92½	102
Milwaukee Elec. Ry. & Lt., 7% pf.	k102	100	103
Milwaukee Elec. Ry. & Lt., 6% pf.	k 99	98	101½
Minn. Pwr. & Lt., 7% pf.	l107½	104	107
Miss. Pwr. & Lt., $8 pf.	k114	106	111
Miss. River Pwr., 6% pf.	101	94	97
Miss. River Pwr. 3% com.	62	....	....
Mohawk Hudson Pwr., 1st pf.—$7 —no par	k107	100	109
Mohawk Hudson Pwr., 2d pf.—$7 —no par	k106½	98	105
Mohawk Hudson Pwr., com.—no par	25½	20½	27
Montana Pwr., 7% pf.	m121½	118½	123
Montana Pwr., 5% com.	99½	81½	104½
Montreal Pwr., 7½% com.	m 85	....	....
Mountain States Pwr., 7% pf.	k100½	97	101
Mountain States pwr., com.†	18	....	....
NASSAU & SUFFOLK LTG., 7% pf.	108	98	105
National Carbon, 8% pf.	m137	130½	137½
National Elec. Pwr., A†	a 24½	23½	25½
National Lt., Ht. & Pwr., com.	24	....	....
National, Light, Ht. & Pwr., 5% pf.	70	....	....
National Pwr. & Lt., pf.—$7—no par	107	101	108½
National Pwr. & Lt., com.†—no par.	22	19½	23½
National Pub. Serv., 7% pf.	98	93	100
National Pub. Serv., 7% pfc., pf.	113	108	115
National Pub. Serv., A com. $1.60— no par	22½	18½	22½
National Pub. Serv., B com.—no par	18½	14	20½
Nebraska Pwr., 7% pf.	l109½	106	108½
Nevada-Calif. Elec., com.	m 28½	25	31
New Brunswick Pwr., 4% pf.	55	....	....
New Eng. Pub. Serv., pr. ln. pf. $7..	100	98½	101
New Eng. Pub. Serv., pf. $7.	97	95	97½
New Orleans Pub. Serv.—7% pf.	104½	103	105
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	k 92	91	95
N. Y. Central Elec., 7% pf.	102	102	104
Newport News & Hampton Ry., Gas & Elec., 5% com.	109	....	....
Newport News & Hampton Ry., Gas & Elec., 7% pf.	109	....	....
Niagara Falls Pwr., 7% pf.—25	29	27½	29½
Niagara, Lock. & Ont. Pwr., 7% pf	114	112½	116
No. Amer., 6% pf.—50	k 51½	50	52½
No. Amer., com.—10	49½	45½	52½
No. Amer. Edison, $6 pf.—no par	101½	96½	101½
No. Caro. Pub. Serv., pf.—$7—no par	99½	93	100
Northeastern Pwr., com.	17	14½	18½
No. Indiana Public Service	104½	102	104
No. N. Y. Utilities, 7% pf.	105½	103	109
No. Ohio Pwr., com.—no par	11½	9½	13½
No. Ohio Trac. & Lt., 6% pf.	80	78	81
No. Ohio Trac. & Lt., 7% pf.	90	90	93
No. Ont. Lt. & Pwr., 6% pf.	k 92	84	94½
No. Ont. Lt. & Pwr., 4% com.	74	73	78
No. States Pwr., (Del.) 7% pf.	106½	100½	107
No. States Pwr., (Del.) 8% com.	117	109½	124
No. Texas Elec., 6% pf.	70	65	70
No. Texas Elec., com.	22	27	36
OHIO BRASS, com. B $4—no par.	82	74	85
Ohio Brass, 6% pf.	105	100	103
Ohio Pwr., 6% pf.	102½	96	103
Ohio Pub. Serv., $6 pf.	95½	95	96½
Ohio Pub. Serv., 7% pf.	108	103	109
Ohio River Edison, 7% pf.	109	103	109½
Oklahoma Gas & Elec., 7% pf.	100	....	....
PACIFIC GAS & ELEC., 6% pf.	26	24½	26½
Pacific Gas & Elec., 8% new com.	37½	31	39½
Pacific Pwr. & Lt., 7% pf.	l104	102	104
Penn Cent. Lt. & Pwr., $5 pf.—no par	c 74½	71½	75
Penn-Ohio Edison, 7% pf.	102	97½	104½
Penn-Ohio Elec., 7% pf.	99	98	100
Penn-Ohio Pwr. & Lt., 7% pf.	103	99	103
Penn-Ohio Pwr. & Lt., 8% pf.	113	109	113
Penn Pwr.& Lt.—$7—no par	l108	107	108½
Penn Wtr. & Pwr., 8% com., new	c 49	48½	49
Phila. Co., 6% pf.—50	k 51½	50	53
Phila. Co., com.—50	k102	85½	110
Phila. Elec., 8% com.—25	c 50	46½	54
Portland Elec. Pwr., 7% pf.	99½	97½	101
Portland Elec. Pwr., 6% pf.	k 77	78	83
Portland Elec. Pwr., 6% 2d pf.	50	55	70
Portland Elec. Pwr., com.	24	22	30
Potomac Elec. Pwr., pf.	m108½	....	....
Pwr. Corp. of N. Y., com. $1—no par	m 79	....	....
Pwr. Sec., pf.—no par	k 28	28	33
Pwr. Sec., com.—no par	k 6	5	8
Public Serv. of Colorado, 7% pf.	l100	90	100
Pub. Serv. of N. J., 6% pf.	100½	98½	101½
Pub. Serv. of N. J., 8% pf.	k131	125	131½
P. S. of N. J., $2 com.—no par	41½	32	45½
Pub. Serv. of No. Ill., 6% pf.	a104	102	105½
Pub. Serv. of No. Ill., 7% pf.	a115½	112½	116½
P. S. of No. Ill., com. $8—no par	a141½	130½	143
Pub. Serv. of No. Ill., $8 com.	a141	132	142
Pub. Serv. of Okla., 7% pr. ln.	100	99	100½
Pub. Serv. Elec. & Gas, 6% pf.	106½	102	108½
Puget Sound Pwr. & Lt., 7% pr. pf.	111	103½	111
Puget Sound Pwr. & Lt., $6 pf.—no par	88	83½	88
Puget Sound Pwr. & Lt., com.	35	28	35½
RADIO CORP. OF AMER., $3.50 pf.—50	51½	49	53
Radio Corp. of Amer., com.—no par.	52½	41½	56½
Republic Ry. & Lt., pf.	k120	....	....
Republic Ry. & Lt., com.	k135	112	135
Rochester Gas & Elec. 6% pf. D	k103	101	103½
Rochester Gas & Elec., 7% pf. B	k106	105	107
Rochester Gas & Elec., 6% pf. C	104	101½	103½
SAFETY CABLE, com. $4	68	52½	71½
San Joaquin Lt. & Pwr., 7% pr. pf.	106	105	108
St. Joseph Ry., L., H. & P., 5% pf.	72	70	73
Servel Corp.	5	5	10½
Sierra Pacific Elec., 2% com.	24	....	....
Sioux City Gas & Elec., 7% pf.	103	99	101½
Southeastern Pwr. & Lt., pf.—$7 no par	l104½	....	....
Southeastern Pwr.& Lt.,pfc.pf.ex div.	l 78	....	....
Southeastern Pwr. & Lt., com.—no par ex. div.	36½	29½	38½
So. Calif. Edison, 8% pf.	36	36½	38
So. Calif. Edison, 7% pf.	28	27½	28½
So. Calif. Edison, 6% pf.	25	24½	25½
So. Calif. Edison, 8% com.	35½	31½	36½
Southern Cities Utilities, 7% pf.	85	81	86½
Southern Cities Utilities, com. $4	37	....	....
Southwestern Lt. & Pwr., A $3	k 65	60	65
Southwestern Lt. & Pwr., B	k 65	60	65
Southwestern Lt. & Pwr., $6 pf.	k 83	83	91½
Southwestern Pwr. & Lt., 7% pf.	k109½	103	110
Springfield (Mo.) Ry. & Lt., 7% pf	102	95	102
Standard Gas & Elec., 8% pf	62½	57½	64
Standard Gas & Elec., 7% pr. pf.	109½	104½	110½
Standard G. & E., com. $3.50—no par	61½	54	65½
Standard Pwr. & Lt., 7% pf.	102	98	102½
Staten Island Edison, pf.—$6—no par	k100½	99	101
Superheater, $6 com.—no par	176	....	....
Syracuse Lighting, 7% pf.	105½	103	107
Syracuse Lighting, 8% pf.	115	....	....
Syracuse Lighting, 8% com.—no par	300	....	....
TAMPA ELEC., com. $2	61	49	64
Tenn. Elec. Pwr., 6% pf.	96½	92	97
Tenn. Elec. Pwr., 7% pf.	107	103	106½
Terre Haute, Ind. & East. Trac., 5% pf.	20	20	25
Terre Haute, Ind. & East. Trac., com	1	1	3
Tex. Pwr. & Lt., 7% pf.	l109½	106	109½
Tide Water Pwr., 8% pf.	108	105	108½
Timken Roller Bear., com.—$4 no par	100½	78	106½
Toledo Edison, 8% pf.	k116½	115	118
Toledo Edison, 7% pf.	l106½	104	106½
Toledo Edison, 6% pf.	k 97½	95	97
Toledo Edison, 6% com.	k100	....	....
Tri-City Ry. & Lt., 6% pf.	97	90	97
UNITED GAS & ELEC., 6% pf.	k101½	98	101½
United Gas & Elec., com.—no par.	m 57	....	....
United Gas & Elec. (N. J.) 5% pf.	72	70	73
United Gas Impr., 8% com.—50	c107½	89½	108½
United Lt. & Pwr., pf.—$4—no par.	52½	49	53½
United Lt. & Pwr., pf.—$6.50—no par	96½	87	97½
United L. & P., com. A .48—no par.	14	12½	15½
United L. & P., com. B .48—no par.	k 17	16	18
Utah Pwr. & Lt., 7% pf.	l107	104	108½
Utica Gas & Elec., 7% pf.	106½	105	106½
Utica Gas & Elec., 8% com.	200	....	....
Utilities Pwr. & Lt., 7% pf.	95	93	100
Utilities Pwr. & Lt., com. A $2	30½	27	34
Utilities Pwr. & Lt., com. B $1—no par	16½	13½	19
VERMONT HYDRO-ELEC., 7% pf.	97½	95	97½
Virginia Elec. & Pwr., 7% pf.	107	105	107
Virginian Pwr., 7% pf.	108	....	....
Virginian Pwr., com.	70	....	....
WAGNER ELEC., 7% pf.	b 89	68	90
Wagner Elec., com.—no par	b 37	18½	39½
Washington Ry. & Elec., 5% com.	253	....	....
Washington Ry.& Elec.,5% pf.	m 91½	....	....
Washington Wtr. Pwr., 8% com.	155	136	160
West Penn Elec., 7% pf.	110½	102	110½
West Penn Elec., Cl. A $7.	107	97½	110
West Penn Pwr., 7% pf.	115	111	118
West Penn Pwr., 6% pf.	107	100½	108
West Virginia Lt., Ht. & Pwr., 7% pf.	93½	94	96
West Va. Utilities, 7% pf.—50	50	48	51½
Western Pwr., 7% pf.	101	97½	102
Western States Gas & Elec., 7% pf.	k101	96	100½
Western States Gas & Elec., com.	21	....	....
Westinghouse Elec. & Mfg., 8% com. —50	74½	67½	77½
Weston Elec. Instrument, Cl. A $2 —no par	k31½	30½	34½
Weston Elec. Instrument, com.—no par	15	15	18½
Wheeling Elec., 6% pf.	100	95	97
Worthington Pump, 7% pf. A	60	46	61½
Worthington Pump, 6% B	52½	40	54½
Worthington Pump, com.	41½	20½	46
YALE & TOWNE com. $5—25	80	70½	81

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; f Montreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid price Saturday, June 11. lBid price Wednesday, June 15. mLatest quotations available. †Dividend rate variable.

Quebec Power Plans Four-for-One Split.—Directors of the Quebec Power Company, a subsidiary of the Shawinigan Water & Power Company, have called a special meeting of stockholders for July 12 to vote on a proposal to split the common shares four to one. It has been proposed to change the par value of the stock from $100 to no par.

Allis-Chalmers Calls Preferred Stock.—All of the outstanding preferred stock of the Allis-Chalmers Manufacturing Company has been called for redemption July 1 at 110 and dividends.

Northern States Power Increases Capital.—An increase of $15,000,000 in the capital stock of the Northern States Power Company of Minnesota, from $60,000,000 to $75,000,000, has been authorized at a special meeting of the directors. The increase was arranged as a step toward bringing the authorized capitalization of the Northern States Power Company of Minnesota, an operating concern, more nearly in line with that of the Northern States Power Company of Delaware, the holding corporation.

Company Reports

Name of Company	Gross Earnings Twelve Months Ended Apr. 30 1927	1926
Adirondack Power & Light	$9,433,007	$8,631,061
American Power & Light	61,474,325	54,315,772
Bangor Hydro-Electric	1,778,988	1,631,374
Baton Rouge Electric	996,786	860,200
Binghamton Lt., Ht. & Pwr.	2,000,959	1,776,559
Blackstone Valley Gas & Elec.	5,653,261	5,254,972
Cape Breton Electric	641,525	565,004
Cities Service	28,604,880	20,835,048
Commonwealth Power	50,665,794	46,065,925
Consumers Power	25,004,746	21,872,886
Eastern Texas Electric	6,178,471	4,193,081
Edison Elec. Ill. of Brockton	1,819,005	1,701,275
Electric Light & Power of Abington & Rockland	583,651	568,062
El Paso Electric	2,895,487	2,629,663
Engineers Public Service	27,689,528	24,322,677
Federal Light & Traction	6,791,384	6,113,666
Florida Public Service	1,764,224	1,312,967
Fort Worth Power & Light	2,857,188	2,851,907
Galveston-Houston Electric	4,802,534	4,053,090
General Gas & Electric	25,012,365	21,836,942
Idaho Power	2,892,629	2,868,129
Kansas City Power & Light	11,143,716	10,514,313
Lowell Electric Light	1,744,685	1,662,364
Metropolitan Edison	9,816,112	9,046,505
Nebraska Power	4,540,890	4,226,470
New Jersey Power & Light	2,548,834	1,745,720
North Carolina Pub. Service	2,237,219	1,893,320
Northern Ohio Power	12,087,320	11,828,094
Northern Texas Electric	2,560,905	2,463,220
Pacific Gas & Electric	52,924,383	48,872,851
Pacific Power & Light	3,723,531	3,655,056
Portland Electric Power	11,989,367	11,208,741
Puget Sound Power & Light	14,036,883	13,009,875
Savannah Electric & Power	2,247,571	2,060,436
Sierra Pacific Electric	1,263,180	1,153,504
Southern California Edison	28,908,505	25,653,216
Tampa Electric	4,852,062	4,007,307
Tennessee Electric Power	12,096,974	11,793 342
Texas Power & Light	8,445,269	7,083,123
West Penn Electric	35,581,153	32,396,616

Production Conditions Spotty

Rate of Operations, Based on Consumption of Electrical Energy, 1.4 per Cent Under April but 6.8 per Cent Over Last Year—Automobiles Down

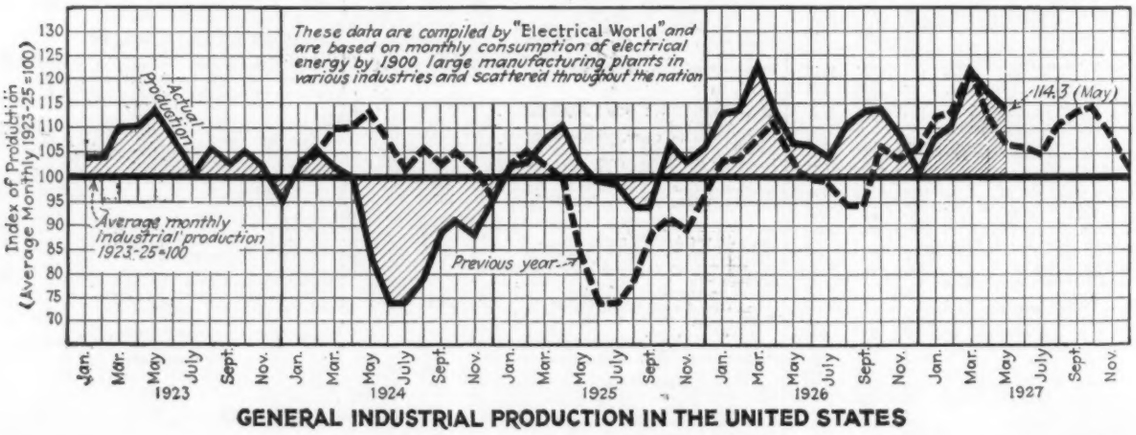
A SLIGHT recession in production of a seasonal character was recorded by the manufacturing plants of the nation during May. Based on the consumption of electrical energy, the rate of productive activity during that month was 1.4 per cent under April, but was 6.8 per cent over May of last year. Basic reports indicate that production conditions are very irregular, some of the primary industries reporting a drop in activity of considerable importance, while others, it appears, were producing at an increased rate over April. Within the industries themselves the same conditions appear to exist, some companies reporting increased production, while the industry as a whole is on a distinctly downward trend. This condition was especially true in the automobile manufacturing plants. Several of these companies reported operations during May above those of April, while other companies reported a drastic drop in production. Such is the general picture of productive activities in the manufacturing plants of the nation as indicated by the consumption of electrical energy by about two thousand large manufacturing plants scattered throughout the nation and in various industries—manufacturing plants consuming approximately ten billion kilowatt-hours of electrical energy per annum.

Virtually all of the primary industries appeared to be turning out commodities above the production of May last year, the automobile industry being a striking exception. What proportion of this apparently increased general production was due to the natural growth of industrial operations to meet the demands of an increased population is questionable, but that production by the manufacturing plants of the nation in general was above that of last year is clearly indicated by the electrical energy reports of the same manufacturing companies—these companies consuming 936,000,000 kw.-hr. of electrical energy in May of this year as against 876,000,000 kw.-hr. in May of last year.

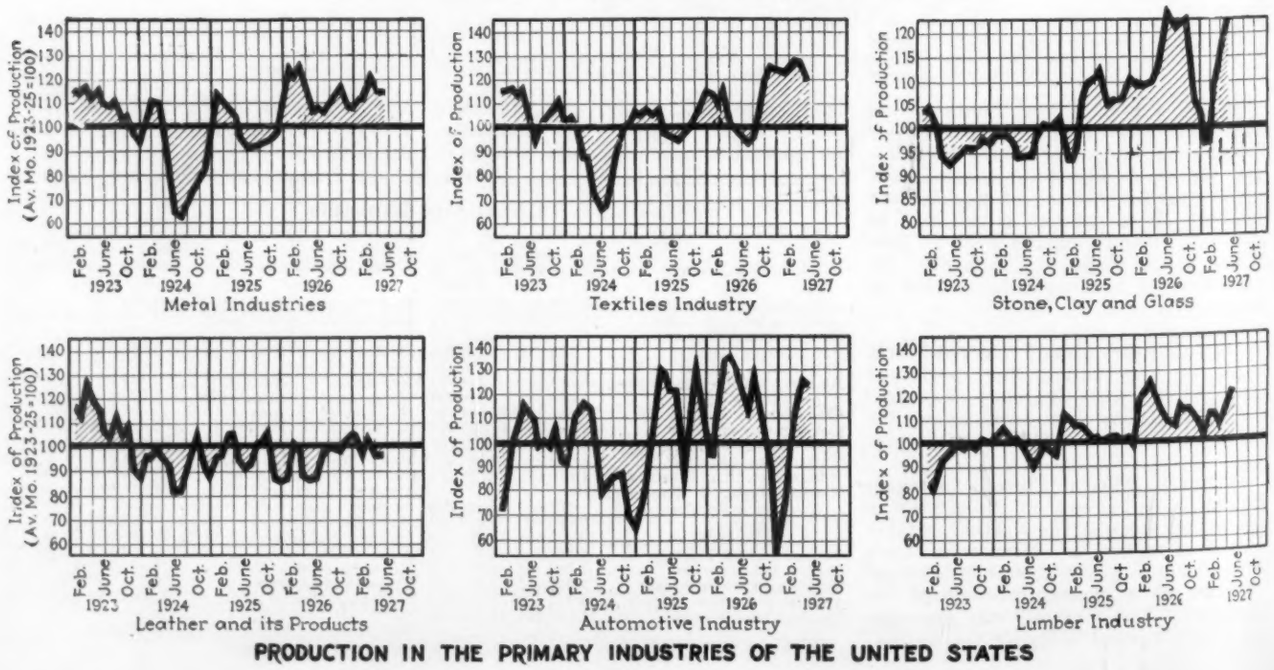
The automotive manufacturing plants appear to be the only outstanding primary industry operating materially under May of last year, but on account of the fact that some of these plants are operating at a very high rate and others at a relatively low rate, it is difficult to obtain an exact picture of production in that industry without the fullest returns. The indications are, however, that the May productive activities of the automobile plants were about 0.5 per cent under those of April and that the actual May production was about 6.3 per cent under May of last year. There seems to be every indication that a more than seasonal curtailment will be reported for June by the automobile manufacturing plants of the country.

The seasonal influence was especially noticeable in the textile industry, the May operations being 3.4 per cent under those of April but still 24.5 per cent over May of last year. The textile industry is still feeling the favorable effects of the low price of cotton prevalent during the past winter and spring months. The metals group decreased their activity by 1.2 per cent.

(Unadjusted for Seasonal Variation)


These data are compiled by "Electrical World" and are based on monthly consumption of electrical energy by 1900 large manufacturing plants in various industries and scattered throughout the nation
Index of Production (Average Monthly 1923-25 =100)
Actual Production
Average monthly industrial production 1923-25=100
Previous year
114.3 (May)
Jan. Mar. May July Sept. Nov.
1923
1924
1925
1926
1927

GENERAL INDUSTRIAL PRODUCTION IN THE UNITED STATES



PRODUCTION IN THE PRIMARY INDUSTRIES OF THE UNITED STATES

Manufacturing and Markets

World Trade and Prosperity

Dr. Cassel at Economic Conference at Geneva Discusses Causes of World's Economic Dislocation—Discrepancy in Prices of Raw and Finished Products Cited

PROGRESS in world trade will be made possible only by the sincere collaboration of all nations working together, said Dr. Karl Gustav Cassel, professor at the University of Stockholm, Sweden, before the International Economic Conference at Geneva, Switzerland. He pointed out that first among the false ideas that hamper trade stands the idea that it would be advantageous to suppress other countries and to destroy their trade in order to make room for the trade of one's own country. Another false idea referred to was that the general purchasing power of the world is too small for the world's actual production. The consequence of this view is, of course, that production must be curtailed.

"Shall the collaboration be sought in agreements calculated to restrict output and reduce the world's real income, or shall we try to unite all nations in the aim of increasing the world's production, making the world richer and supplying its population more fully with all that it needs for raising its standard of living?" said Dr. Cassel. "The purchasing power of human society can never be anything else than the total product of that society. If we believe that the total purchasing power of the present world is too small, there can be no other remedy than an increase of the world's production. On the other hand, if we should choose deliberately to reduce the world's total production and bring it down on a level with an assumed purchasing power, the result would only be that the real purchasing power would be reduced in the same proportion and that the world would be so much poorer. When we say that the total purchasing power is always sufficient to buy the whole production of society, this does not, of course, mean that the producer can find a buyer for any product he fancies to produce at any price he thinks necessary to ask. Naturally the producer has to accommodate himself to the needs of the market. If the price which the market is willing to pay is found to be too low, the producer has to reduce his cost of production, or, if that is not possible, he has to transfer his means of production to other occupations for which there is a better demand.

"The most characteristic feature of the European economic situation is the very incomplete use made of Europe's productive powers, and particularly the widespread and long continued unemployment of its labor. This is not only an internal European interest. If Europe cannot find full employment for its magnificient productive capacity, the rest of the world will be more scantily supplied with European goods and European services and at the same time will find European purchasing power inadequate. The actual facts are these: The products of European industry are to a large extent too costly and therefore fail to find a sufficient market. On the other hand, the monopolistic forces prevailing in many countries prevent the productive powers from moving to better occupations, with the result that industry experiences a great difficult in keeping its works going and that labor suffers from an unemployment which in some countries has taken really alarming dimensions.

DR. CASSEL, in his paper read before the International Economic Conference at Geneva, Switzerland, an abstract of which appears here, points to a fundamental cause of the world's economic dislocation. This, he thinks, is the discrepancy in prices between goods which are nearly ready for consumption and goods in the earlier stages of production—raw material. The rise of prices since 1913 has been generally much greater for finished products than for raw material.

A company operating at the raw-product end of the scale thus gets poorer prices proportionately, while, on the other hand, the manufacturer dealing with a highly finished product is at the high end of the scale and gets relatively better prices. This explains the distress of the agricultural industry, since for its product it gets in exchange less of manufactured goods and immediate service. Compared with other industries, the raw-products branches, agriculture and mines, are thus curtailed in their buying of electrical goods.

The electrical industry, therefore, should be keenly interested in effecting a solution of this price dislocation in the effort to lessen the discrepancy that exists between the prices for raw and finished products as compared with 1913 prices.

Monopolies and Artificial Levels

"The monopolies of great industrial concerns striving to raise prices above the market level are in principle the same thing as the monopolies of such trades unions as try to establish an artificially high level of wages which can only be attained by excluding other labor. Likewise, all government efforts to prevent productive powers from being used in the most economical way are apt to create monopolistic situations. As we all know, the post-war development of international trade relations has been very unsatisfactory. Tariffs have been raised and have been subjected to administrative alterations and a general state of insecurity has been brought about. We cannot, of course, hope immediately to come to a state of complete freedom of trade, but we can abolish the most serious hindrances to an international exchange of goods. The free movement of productive powers has been hindered in the case of labor, which has been hampered in its internal movements as well as in its movements between different countries, but we can get an idea of what a freer mobility of productive forces means for the general economic welfare if we look upon the beneficent effects which have been the result of the comparatively free mobility of capital. In fact, the international mobility of capital has been by far the most important factor in the recovery which, in spite of all difficulties, has already taken place.

Dislocation of Prices

"The recent disturbed equilibrium of the world's economy is caused in part by dislocation of prices. The rise of prices since 1913 has been generally much greater for goods which are nearly ripe for consumption than for goods in the earlier stages of production. Take, for instance, these Swedish index figures for December, 1926: For cattle, 119; for manure, 127; for fodder, 130; for meat, 142, and for dairy produce, 154. We find here a strong tendency for prices to rise as goods move forward in the process of production. A still more marked difference appears in the leather industry, where hides and skins stand at 87, leather at 107 and footwear at 157. The consequence is that the cost of living has risen since 1913 considerably more than the general wholesale prices. In fact, the index cost of living is 171, whereas wholesale prices stand at 150.

"To this general dislocation of prices corresponds a similar dislocation of wages. In those trades which have a distinct local market and which are naturally protected from outside competition trades unions have been able to raise their wages very much above the level prevalent in other and more competitive trades. Such a monopolistic situation is most easily created in the local building trades, in inland transport, in the works of local bodies, and, to a great extent, in the food-preparing industries. Action of this kind is always likely principally to affect the prices of highly manufactured

goods, the cost of distribution to the consumers, and personal services. Such movement of wages must therefore always have the result that the cost of living increases in comparison with the general level of wholesale prices. For example, the cost of building material in Stockholm shows for December, 1926, an index figure of 186, which is already very much above the general index of wholesale prices, 150. The index for total building costs, however, is much higher, viz., 215, the explanation being that wages in building trades have reached an index of not less than 259.

"In transport a similar line of development is equally pronounced. In ocean shipping, where international competition is unlimited, freight rates have fallen very considerably; in fact, the index figure now usually stands in the neighborhood of 100. On the other hand, the freight index figure for the Swedish State Railways is 240. Carriage by rail is just one of those locally protected trades in which it has been comparatively easy to push up prices. These tendencies are by no means peculiar to Sweden. This rise of the prices of consumers' goods in comparison with those of goods of earlier stages of production is essentially a consequence of the particular increase in the costs of production in certain trades which has resulted from the monopolistic influences of tariffs, of trusts and cartels, and of the locally protected trades unions.

EFFECT OF PRICE DISLOCATION

"This dislocation of prices has inevitably been to the disadvantage of certain classes of producers who have had to pay for advantages secured by other classes. It is clear enough that agriculture and, to a great extent, production of raw materials are among the chief sufferers. For their produce they get in exchange less of manufactured goods and immediate service. A similar alteration has taken place in the conditions for the exchange of goods between Europe and the colonial world. The main trend of development is a fall in the prices of colonial products as compared with those of the manufactured goods which Europe has to offer in exchange. The colonial world now gets considerably less in exchange for its goods than it used to before the war. On the other hand, Europe has difficulty in selling its products and suffers from a congested market and from unemployment. In fact, Europe is like a manufacturer who keeps his prices too high and who is, therefore, obliged to store a part of his production. What Europe is storing, however, speaking broadly, is not goods but unemployed labor.

"The development of agriculture and of the colonial world is, however, hampered by the reduction which has taken place in European savings and in Europe's capacity of putting fresh capital at the disposal of agriculture and of the colonial world. The result has been a general slowing down of colonial development. In this way the colonial world is suffering. But Europe is also suffering. First, Europe does not get the increased supply of colonial products of which it is in such great need for its increasing population. And second—and this is a point which deserves our most particular attention—when the colonial world cannot borrow money, those European industries which produce capital goods find their colonial markets restrained. That is why the depression in Europe is most strongly felt in the capital-producing industries, and therefore in England and in Germany.

"We have now before us the main lines of the world's economic situation such as it presents itself in the light of a scientific analysis of the facts. It is easy to see what an unfortunate rôle monopolism in its various forms has played in the development of the deplorable situation. The serious and widespread dislocation of prices and wages which has taken place since the war and which has given rise to entirely abnormal unemployment is the great tangible result of the monopolistic tendencies of our day. However the responsibility for this unfortunate development may be divided, the situation which Europe, by the aid of unemployment doles, is preparing for industrial labor, which is not allowed to perform useful work for the world's economy, while at the same time agriculture and colonial production suffer from an insufficient and too highly priced supply of industrial products, must be looked upon as the most emphatic expression of the fundamental fallacy of monopolism."

Marketing Electrical Equipment in Australia

In the fiscal year 1923-24 the Commonwealth of Australia imported $23,677,735 worth of electrical goods and in 1924-25 $30,568,102 worth. The Australian import statistics place the amounts from the United States at $6,262,230 and $6,827,839, respectively, for these periods. Official statistics of the United States give the quantities exported from this country to Australia during the calendar year 1924 as $5,237,398 and in 1925 as $5,103,700. Trade information bulletin No. 487, entitled, "Electrical Development and Guide to Marketing of Electrical Equipment in Australia," and issued by the Department of Commerce, covers the Australian market in detail.

Julius Klein, director of the Bureau of Foreign and Domestic Commerce, in the foreword of the bulletin writes: "There is in Australia a friendly attitude toward things American, which, coupled with the high quality of our goods, gives American manufacturers a recognized place in the Australian market. The conditions and requirements brought about by its geographical position and characteristics make Australia a somewhat peculiar market, and these points should be considered in any effort to develop this trade. With proper selling methods and with the maintenance of supplies of suitable merchandise manufacturers of electrical goods may find a very satisfactory and profitable outlet in Australia."

The bulletin discusses the marketing of various products as well as the usual plan of distribution in vogue in Australia. The best method for a manufacturer to adopt in securing representatives is also outlined as well as the prices and terms necessary for securing business.

Electric Industrial Trucks and Tractors

April shipments of electric industrial trucks and tractors, as reported to the Department of Commerce by the nine leading manufacturers in the industry, were 105, as compared with 116 in March and 111 in April, 1926. The accompanying table gives the shipments for 1926 and 1927 up to and including April.

SHIPMENTS OF ELECTRIC INDUSTRIAL TRUCKS AND TRACTORS

	Domestic		
1926	Tractors	All Other Types	Exports
January	21	86	4
February	15	96	5
March	11	128	8
April	17	90	4
Total four months	64	400	21
May	12	87	9
June	21	104	19
July	15	95	1
August	14	81	2
September	10	82	5
October	18	97	17
November	18	86	19
December	18	95	5
Total (year)	190	1,127	98
1927			
January	6	67	17
February	11	120	7
March	10	96	10
April	12	89	4
Total four months	39	372	38

Orders for Electrical Goods

New orders for electrical goods booked during the first quarter of 1927, as reported to the Department of Commerce by 86 manufacturers, totaled 251,755,567, as compared with $260,078,082 for the fourth quarter of 1926 and $262,677,736 for the first quarter of 1926. The accompanying table gives the revised totals of bookings for each quarter from 1922 to 1926 inclusive and is presented not as a complete statement of the industry but as probably sufficiently representative to indicate the trend.

ORDERS FOR ELECTRICAL GOODS

Quarter	1922	1923	1924	1925	1926	1927
First	$143,320,453	$225,399,383	$228,760,838	$233,023,182	$262,677,736	$251,755,567
Second	165,370,750	240,542,824	221,167,876	227,502,652	248,000,075	.....
Third	167,984,466	201,910,099	185,747,314	232,933,532	241,114,209	.....
Fourth	192,473,402	218,165,415	231,470,552	244,597,050	260,078,082	.....
Total	$669,149,071	$886,017,721	$867,146,580	$938,056,416	$1,011,870,102	.....

Many Delegates to Attend Conference at Stockholm

Headed by Owen D. Young, chairman of the board of the General Electric Company, as chairman of the American delegation to the economic conference of the International Chamber of Commerce to be held at Stockholm, June 27 to July 2, 150 prominent business men representing all sections of the country and all phases of American industrial, financial and commercial life sailed this week. The United States government has recognized the importance of the conference by sending twenty members of the foreign service from their posts in Washington and foreign capitals as guests of the American delegation to furnish them with the latest information on the economic conditions of foreign countries. Leland Harrison, American Minister to Sweden, will head the government representatives.

Mr. Young in commenting on the conference emphasized its great importance to the continued peace and prosperity of the American people and of all the peoples of the world and said that the principal international problems today were economic rather than political. He declared that international co-operation among the practical business men of the commercial nations of the world was an absolute necessity in order to solve the remaining post-war problems which prevent the full development of international trade and of maximum prosperity for all countries. The conference, he explained, would concentrate on efforts to create a world public opinion which, he hoped, would enable the governments to get together for the removal of trade barriers between nations. Among the important questions the conference will discuss under this heading are the free movement of raw materials, import and export restrictions, discriminatory treatment of foreign nations, companies and capital; obstacles to transportation, international combinations, and complicated and wasteful customs procedures.

Edward J. Mehren, vice-president of the McGraw-Hill Publishing Company, Inc., will attend the conference and will report the result of the meetings for the benefit of the readers of the ELECTRICAL WORLD.

Construction Volume Shows Large Gain

Big Pipe-Line Jobs Furnish Bulk of Gain—Deducting These, Volume Is Slightly Higher than in 1926

THE cumulative total of money spent for engineering construction in the United States is ahead of last year by a wide margin, according to figures compiled by the *Engineering News-Record*. The term "engineering construction" includes waterworks, excavation, drainage, irrigation, levee and river and harbor projects having a minimum value of $15,000; other public works not less than $25,000; industrial buildings costing $40,000 or more, and commercial, educational, institutional, religious and other buildings having a value of $150,000 or over.

The cumulative total of $1,162,551,000 contains at least $40,000,000 in big pipe-line contracts. Deducting the value of these pipe-line jobs leaves the total for Jan. 1 to June 1, 1927, a fraction of 1 per cent over the 1926 amount for the same period. The construction volume index number for the month of May was 299, which compares with 228 for the whole of 1926, as against 100 for 1913. This indicates a record for any single month so far. The index number contains the increment of construction and indicates the rate at which contracts are being let as compared with 1913 awards. The index number thus refers to the actual volume of contract letting, not the mere money value of contracts let.

The extraordinary increase in construction projects was not in buildings nor even in paving projects, but most of the gains were made by unclassified contracts, federal government work and public bridge projects. A comparison with May of last year shows substantial increases in awards for waterworks, private excavating projects, streets and roads, and buildings of a commercial type. Definite gains developed during May in Vermont, Massachusets, Rhode Island, New York, Maryland, South Carolina, Ohio, Illinois, Michigan, Missouri, Arkansas, the Dakotas, Nebraska, Kansas, Texas, Montana, Wyoming, Colorado, New Mexico, Utah, Nevada and California. The accompanying table gives the value of contracts awarded in the United States by territorial divisions and in Canada during May.

Business Conditions

BUSINESS continues to be transacted in fair volume in the electrical industry. Although there has been a decrease in sales as compared with last year, it is not large and has had little effect on the attitude of electrical men. Conservative buying is apparently the greatest factor in creating an uncertainty regarding current sales, but the total volume of sales continues to be maintained at a steady level. Manufacturers are anticipating a decrease during the summer months and do not look for the same volume of buying as was recorded during those months last year. A number of large projects pending, or for which negotiations are now pending, would indicate that the decrease should be small.

In New England a well-sustained volume of small orders was booked, and motor sales are running close to the totals of last year for the same period. Inquiries have increased in the New York district, although sales to utility companies are quiet. A better demand is noted from industrial plants. In the Southeast buying is in better volume, although activities may be termed generally quiet with little likelihood of an accelerated movement before fall. Optimism prevails in the St. Louis district and business is fair. A few fair-sized orders were booked and others are known to be pending. A considerable amount of business is being transacted in the Middle West, although the volume has fallen off. Buyers are exhibiting a conservative attitude. Sales on the Pacific Coast are in fair volume and are composed mainly of small orders for pole-line hardware specials. Several inquiries for special wire were also reported.

Prices Decrease in Metal Market —Buying Small Except in Lead

Lower prices characterize the domestic markets for all of the non-ferrous metals. Activity in lead has been well up to the average at prices only fractionally lower than a week ago. Zinc has been comparatively quiet. Tin has been moderately active with prices off about ⅛ cent, and the copper market

VALUE OF CONTRACTS LET IN THE UNITED STATES AND CANADA DURING MAY, 1927

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States	Jan. 1 to Date, U. S.	Canada
Waterworks	$195,000	$520,000	.....	$609,000	$1,323,000	$656,000	$3,303,000	**$23,608,000**	$290,000
Sewers	688,000	3,395,000	$84,000	4,376,000	1,655,000	1,428,000	11,626,000	**44,232,000**	345,000
Bridges	1,202,000	6,367,000	806,000	25,203,000	827,000	233,000	34,638,000	**54,890,000**	.....
Excavations, drainage, etc.	11,000	849,000	187,000	.....	101,000	545,000	1,693,000	**17,197,000**	129,000
Streets and roads	3,300,000	13,478,000	2,726,000	12,078,000	9,510,000	7,026,000	48,118,000	**164,670,000**	1,312,000
Industrial buildings	2,029,000	7,223,000	280,000	4,878,000	3,490,000	1,003,000	18,903,000	**97,947,000**	2,468,000
Commercial buildings	11,478,000	40,432,000	1,100,000	34,143,000	10,553,000	18,990,000	116,696,000	**613,130,000**	268,000
Federal government	100,000	2,196,000	701,000	569,000	259,000	1,562,000	5,387,000	**19,650,000**	.....
Unclassified	265,000	2,596,000	1,468,000	691,000	35,521,000	4,375,000	44,916,000	**127,227,000**	8,807,000
May, 1927	$19,268,000	$77,056,000	$7,352,000	$82,547,000	$63,239,000	$35,818,000	$285,280,000	**$1,162,551,000**	$13,619,000
April, 1927	16,824,000	77,512,000	25,895,000	72,483,000	26,813,000	27,296,000	246,823,000	.....	10,042,000
May, 1926	22,656,000	68,617,000	34,945,000	52,619,000	40,210,000	22,290,000	241,337,000	.....	12,849,000
Jan. 1 to date, 1927	**86,538,000**	**332,644,000**	**83,740,000**	**297,910,000**	**207,920,000**	**153,799,000**	**1,162,551,000**	.....	37,592,000
Jan. 1 to date, 1926	78,939,000	375,763,000	142,138,000	243,851,000	159,018,000	122,673,000	1,122,382,000	.....	52,487,000

NEW YORK METAL MARKET PRICES

	June 9, 1927 Cents per Pound	June 16, 1927 Cents per Pound
Copper electrolytic	12.70	12⅛
Lead, Am. S. & R. price	6.40–6.45	6.40
Antimony	12⅛	12⅛
Nickel, ingot	35	35
Zinc spots	6.25–6.65	6.60
Tin, Straits	68	67⅛
Aluminum, 99 per cent.	26	26

Base copper price June 16, 1927, 14⅛ cents.

has been virtually dead. Such copper sales as were made early in the week were at 12⅛ cents delivered in the East. Aggregate copper sales were lower than for any week in the last two years at least. The rate of production is slightly smaller and foreign shipments have increased. However, the decline in domestic deliveries more than offset both of these factors, resulting in a net increase in stocks. Many observers feel that a crisis is approaching in the copper industry and that some definite developments are due within a very short period.

Inquiries Increase in New York District

Sales to public utility companies in the New York district are quiet in all lines although in some instances an improvement is reported in the number of quotations which are being received. This is particularly true in regard to poles, cross arms, and circuit breakers, where sales continue dull, but inquiries for quotations have increased considerably this month. The demand for transformers, switching equipment, line hardware, etc., continues quiet, with individual orders limited to small quantities. The industrial demand for apparatus is better, with general purpose motors of the smaller sizes continuing to find a ready market. An improvement is reported in the demand for medium-sized motors and generators, one manufacturer stating that his sales for last month considerably exceed those for the corresponding month last year. Control apparatus is in good demand and a fair amount of sales of circuit breakers to industrial buyers is reported.

Many Small Orders Placed in New England District

A well-sustained volume of small-order business features the New England trade, with motor sales running close to last year's totals for the same period, street lighting propositions active, heating equipment moving satisfactorily, and lamp sales considerably above 1926 figures. An order for $8,400 worth of circuit breakers was booked and a transformer order for Connecticut industrial service totaling about $20,000 was placed. Five 15-kw. electric heating equipments were recently purchased for use in the manufacture of bakelite moulding, replacing steam-operated presses, and more of this business is in sight. A leading New England maker of leather belting used in this type of motor drive reports increasing business with the plant running at 90 per cent of capacity. A few 40-hp. and 100-hp. motor sales are "going through the works," but in the main, integral horsepower motors not exceeding 10 hp. rating feature current business.

Some large steam turbine and transformer business is in progress but contracts have not yet been awarded. Battery sales are seasonally good, and eliminators for radio service are in excellent demand. Lamp sales are responding to recent price reductions, both in bulbs and in electric service. Jobbers are doing an excellent volume of business, although their facilities are not taxed severely. Two carloads of high-tension cable and ten of fiber conduit were included in last week's orders. A 20,000-kw. frequency charger is expected to be purchased at an early date by the United Electric Railways of Providence, R. I.

Better Sales Noted in Southeast But Business Generally Quiet

Purchases of electrical materials in the Southeast are in better volume though electrical activities in the territory may be termed generally quiet with little likelihood of an accelerated movement before fall. Central-station purchases while mainly reflected in small individual orders for current needs show a slight improvement both in size and number of orders placed. The largest individual order received was from an Alabama power company for $30,000 worth of power transformers, while a power company in Georgia ordered copper wire amounting to approximately $25,000. Another central-station order placed called for $10,000 worth of substation equipment for installation in Mississippi and inquiries in hand on transformer substation and switching equipment are in good volume. Street lighting equipment is in reasonably good demand, the largest single order reported recently calling for $10,000 worth of this equipment for shipment to a South Carolina town.

Line construction activities of the larger power companies are serving to sustain the sales volume of line construction and house wiring materials, the demand for house wiring materials being reported as particularly good in Georgia. One Georgia company recently ordered poles amounting to $8,000, while another company in that state purchased poles totaling $2,400 and wire and cable amounting to $3,200. Another central-station order called for distribution and small power transformers aggregating $2,500. Purchases of house type metering equipment by companies over the territory generally are reported satisfactory, one company ordering house type meters totaling $6,400. Inquiries from industrial plants are good and while no orders of moment were placed by this class of purchaser, there is a satisfactory amount of industrial business in more or less immediate prospect.

Fair Volume of Sales in Middle West—Buyers Conservative

A considerable amount of business is being transacted in the Middle West, although the general volume of business has fallen off materially. Industrial activity continues decidedly spotty, but there seems to be a feeling of calm resignation to conditions as they are, with a firm belief that business conditions are not so bad as they might be. Through it all is the underlying current of optimism. The utility companies are exhibiting a conservative attitude, although in many ways they are in the best of condition. Among the interesting orders placed were one for two boiler units and one reheat boiler unit complete with appurtenances valued at over $1,000,000, 1,085 direct-current watt-hour meters, and "Mazda" lamps valued at $105,000.

Jobbers report a fair volume of sales. Competition is extremely keen, with a marked scarcity of large orders. Appliances continue to move fairly well without any particular leader. The cool weather has not allowed the fan season to get under way as yet. Prices remain generally firm. The most important item is an announcement scheduled for this week of a general advance in the prices of pole-line hardware of approximately 12½ per cent. Manufacturers of lamp cords and portable cords reduced their prices from 3 per cent to 5 per cent.

Optimisim Prevails in St. Louis District—Business Fair

The general feeling in the electrical industry in the St. Louis district seems to be more optimistic. Although no spectacular orders were placed a few of fair size were booked and others are known to be pending. A contract has been closed for a 750-kw. turbo-generating unit with switchboard for one of the power companies in Oklahoma at a total cost of $25,000. Several fair-sized orders for motors and switching equipment to be installed in manufacturing plants have also been placed. The city of St. Louis will open bids June 28 for a complete electric street lighting system covering one of the districts into which the city has been divided. The engineer's estimate on this work is $900,000. The general contract for the St. Louis Municipal Service Building has been awarded for $734,692. The plant will be purchased later. There is considerable activity in the rice fields south of St. Louis. The pumping season is approaching and a large number of sales of electric pumping equipment are predicted.

Sales on the Pacific Coast in Fair Volume

Power company business on the Pacific Coast is fair and is composed mainly of small orders for pole line hardware specials. Three carloads of poles were shipped to California towns. Several inquiries for special wire are reported. An order for one carload of 7,500-volt line switches, placed in Los Angeles, makes the third carload sold this year. Hawaiian business is excellent, ranging from heavy machinery for sugar and pineapple plantations to wiring staples for jobbers' stocks. Manufacturers report a light sale of motors, and very good orders for distribution transformers. A Pacific Coast manufacturer of heating devices reports that his business increased about 15 per cent during the past season, that his present heavy duty heater

sales have more than doubled during the past year and at the present time the production of heavy-duty heating devices accounts for nearly one-third of his plant output.

Sales in the Seattle and Puget Sound districts are light with no particular indications of betterment until after the midsummer shutdown of logging camps and lumber mills. The shutdown this year, it is unofficially stated, may be prolonged from two weeks to a month, but during this time needed repairs and replacements of equipment will probably be made. Sales reported include two 6-in., one 8-in. and one 5-in. motor driven pumps and 12 motors from 50 hp. down for a paper mill in Olympia; three 150-kva. and four 50-kva. transformers and switchboard equipment for a pulp and paper mill and pumping equipment for doubling the capacity of the water system at Selah, Wash. A central-station company also purchased reasonable quantities of wire, poles and distribution equipment for rural extensions and the City of Seattle is expected to place orders in July for three 3,000-kva. transformers.

Activities of the Trade

Allis-Chalmers Company Gets Hetch Hetchy Contract

Contracts recently awarded by the Board of Public Works of the city of San Francisco for electrical transformers, switchgear and accessories for a power line connecting the Moccasin Creek plant with the construction units of the Hetch Hetchy project in the Coast Range division totaled $118,373. The Allis-Chalmers Manufacturing Company of Milwaukee received the order for the transformers, four 2,000 kva. units, primary 154,000 volts, secondary 23,000 volts, and 41 distributing transformers, 23,000 volts to 230 volts, amounting to $72,125; switchgear and lightning arresters were purchased from the H. B. Squires Company, representing the Condit Electrical Manufacturing Corporation, for $40,600, and Champion disconnecting switches were ordered from the Garland-Affolter Engineering Company amounting to $5,648.

Oliver Iron & Steel Offers New Hardware Line

For over a third of a century the Oliver Iron & Steel Corporation, Pittsburgh, which has specialized in producing pole-line hardware for use principally in the telegraph and telephone field, has completely rounded out a line of hardware to include all National Electric Light Association standards for central-station use. Distribution specialties, such as service brackets, secondary racks, insulator pins, crossarm brackets, mast arms, etc., are in the process of development and will be available by Aug. 1, 1927.

The company states that many years' experience in developing and producing material to meet the most rigid and exacting specifications coupled with unlimited manufacturing equipment of the most modern type assures the central-station user of a product that is consistently good. The company further states that large stocks of standard items are now available and will be maintained to give immediate service.

The Radio Electric Clock Corporation, 50 Church Street, New York, recently organized to manufacture electrically-operated clock mechanisms, has plans under way for the construction of a new plant on the Vreeland Mills Road, Linden, N. J., to be one-story, 65 ft. x 100 ft. Colonel Frederick L. Devereaux, president of the Bell Security Company, a subsidiary of the American Telephone & Telegraph Company, is president of the new organization.

Westinghouse Gets Large Order for Switching Equipment

The Westinghouse Electric & Manufacturing Company has received a large order from the Pennsylvania Railroad for switching equipment for installation on the Philadelphia to Wilmington electrification project. The order includes 39 high-speed oil circuit breakers and their relays for the operation and protection of the 11,000-volt trolleys. The order also includes seventeen 66,000-volt outdoor potential transformers, six type O-331 oil circuit breakers, 50 type SV lightning arresters and choke coils, and three large grounding resistors.

The company has also received an order for switching equipment from the United Electric Light & Power Company, New York, for its Hell Gate station. The order includes eighteen 5,000-amp. type O-44 horizontally segregated phase circuit breakers and disconnecting switches. This equipment will be used for the control of a 165,000-kva. generating unit.

J. D. Wallace & Company, 134 South California Avenue, Chicago, manufacturer of woodworking machinery, has placed on the market a portable electric handsaw operated by a universal type of motor.

The Chicago Automatic Electric Boiler Company, Chicago, has placed on the market an automatic domestic electric water heater which does not use any thermostat, valve or moving parts and which eliminates the conventional heating element by utilizing water as the resistance medium.

The P. A. Geier Company, Cleveland, manufacturer of "Royal" electric cleaners, at its annual meeting in May elected Frank J. Gottron president and general manager, Thomas Coughlin executive vice-president, Walter B. Fulghum vice-president in charge of sales, James A. Farrell secretary, and A. H. Zirke assistant treasurer. P. A. Geier becomes chairman of the board and retains the treasurership.

The General Electric Company through its electric refrigeration department at Cleveland announces the appointment of Rex Cole as general distributor for New York City and the metropolitan district. Display rooms are to be established at 5 East Forty-fifth Street, New York. Mr. Cole has for a long time been associated with General Electric interests and until recently was president of the Miller Company. While head of the Miller Company Mr. Cole conceived the idea of the "Home-Lighting Contest," which was one of the largest educational campaigns ever undertaken in behalf of the electric light and power industry.

The Graybar Electric Company, Graybar Building Lexington Avenue and Forty-third Street, New York City, announces that its Birmingham branch is now occupying its new home at 1529 First Avenue, North, Birmingham, Ala. The building comprises two floors containing approximately 18,800 sq.ft. of floor space.

The J. S. Jacobson Company, Chicago, factory representative, announces that it has moved to new and larger quarters at 740 West Adams Street.

The Electric Refrigeration Corporation, Detroit, announces that C. K. Woodbridge, former executive vice-president, was elected president at a recent meeting of the board of directors and A. H. Goss, the retiring president, was elected chairman of the board. H. A. Tremaine, who resigned as chairman of the board, was elected a member of the executive committee, succeeding J. Robert Crouse, who has resigned.

The General Electric Company has completed plans for an extension to its Philadelphia plant at Sixty-eighth Street and Elmwood Avenue.

The Westinghouse Electric & Manufacturing Company announces a price reduction in its auto-valve lightning arresters effective June 10. The price reductions announced include a 10 per cent cut in high-voltage station-type lightning arresters, a reduction of 5 per cent in low-voltage station arresters for 73-kv. service and less, and a cut of from 3 to 7 per cent in the type LV distribution alternating-current arresters.

The Sturdy Manufacturing Company, 41 Commercial Street, Newark, N. J., manufacturer of distribution equipment, has concluded negotiations for a lease of the portion of the former plant of the Mid-West Engine Company, Indianapolis, aggregating about 10,000 sq.ft. of floor space.

The General Electric Company has obtained the contract for installing three 2,500-hp. generators at the High Dam hydro-electric development to be made for the City of Oswego by the Oswego River Power Corporation on a 25-year leasing basis. This will carry out the plans for a 7,500-hp. development of one-half the flow of the Oswego River.

The Falk Corporation, Milwaukee, Wis., manufacturer of herringbone gears, speed reducers, steel castings, diesel engines and flexible couplings, announces the opening of an office in Chicago at 122 South Michigan Avenue, in charge of C. H. Thomas.

New Equipment Available

Speed Reducer

The Caldwell speed reducer, which is a self-contained unit that combines two separate drives—a Link-Belt silent chain drive from the high-speed shaft and a cut spur-gear drive to the low-speed shaft—has been placed on the market by the H. W. Caldwell & Son Company, Western Avenue at Seventeenth Street, Chicago, a subsidiary of the Link-Belt Company of Chicago. The type A unit, which is designed for general industrial use, is made in sizes to furnish ratios from seven to one to forty to one, and the type B, which is made for screw conveyor service, is made to furnish ratios from seven to one to thirty to one. The manufacturer claims that with the Caldwell speed reducer it is not necessary to use a flexible coupling on the motor shaft as the silent chain drive provides the necessary flexibility between the motor and the speed-reducer shaft.

Sky Projector

A sky projector for projecting pictures on clouds in the sky has been designed by the Sperry Gyroscope Company, Brooklyn. The projector uses the Sperry high-intensity arc and has a beam candlepower of 400,000,000. The machine has an over-all length of 25 ft. and may be pointed at any angle in the sky. It is said to be well balanced and can be easily operated by one man.

Oil-Cooling Apparatus

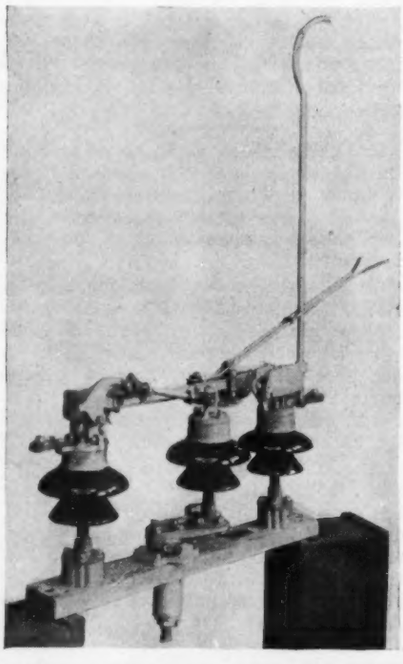
An apparatus for cooling or congealing oil or compound such as is used in the impregnation of electric power cables has been placed on the market by the New York Engineering Company, 75 West Street, New York City. The manufacturers assert that this new cooler provides an efficient and effective cooling apparatus which can be kept under pressure control and varied to suit all the different insulations and sizes of cables manufactured. It is said that this cooler will do the work in a short time and will do it more uniformly, thus materially increasing the capacity of the impregnating tanks. In this new cooler a rotating scraper and agitator not only keeps the cooling surfaces always scraped clean but constantly stirs the oil and thus facilitates the effective heat exchange and causes a uniform and rapid cooling.

The cooling surfaces are arranged as three annular jackets through which the cooling water circulates. Each cooling jacket is piped up separately, making it possible to vary the time of cooling by cutting out one or two of the jackets. The construction of the apparatus is such that cooling may be performed with the whole system under a vacuum. It is said that this machine is particularly well adapted to the handling of any thick, heavy, viscous compound that congeals upon cooling and adheres to the cooling surfaces. The machine may also be used as a heater for heating any material that would ordinarily adhere to the heating surfaces and thus reduce the transmission of the heat. When used as a heater, steam instead of water is introduced into the three jackets.

High-Voltage Switching Equipment

An entirely new line of outdoor switching equipment has been designed by the Hi-Voltage Equipment Company, 3305 Croton Avenue, Cleveland. The company says that its entire line has been redesigned in order to meet the increasingly rigid operating requirements and that features of the old line which have proved their value have been retained, whereas added refinements and improvements have been embodied in the new line as the result of tests under operating conditions. In the new types of equipment all switches have been built with monel-metal ball bearings set in bronze races so that no lubrication is required. All contacts are flexible, self-aligning and protected against the weather. Generous use of material in these new switches is said by the manufacturer to provide an excess of strength, and the equipment has been designed to minimize the labor for installation.

SINGLE-POLE UNIT OF VERTICAL-OPENING, GANG-OPERATED DISCONNECTING SWITCH



AIR-BREAK SWITCH WITH NEW-TYPE HORN CONSTRUCTION

Special attention has been given to ease and positiveness in operation of the disconnecting switches, and this has been accomplished partly by the introduction of a balancing feature in the switch mechanism. A new type of horn construction is used on the air-break switches, and a high degree of interchangeability has been accomplished through standardization on insulators as well as uniformity in mounting dimensions. The new line of equipment includes air-break switches, gang-operated disconnecting switches, "Hi-Voltage" fuses, hook-type disconnecting switches, choke coils, bus supports, connectors, ball-bearing steel shaft, operating mechanism and auxiliaries, as well as various combinations of the above equipment.

Lightning Arrester for Low-Voltage Systems.—To guard low-voltage systems against insulation breakdowns, including failures of relays, transformers and other apparatus resulting in interruption of service, a low-voltage auto-valve lightning arrester has been introduced by the Westinghouse Electric & Manufacturing Company. This arrester is said to be exceptionally fast in operation and capable of discharging high currents without failure. It may be applied to alternating-current systems which operate at 65 volts or less and also on direct-current systems which operate at 45 volts or less. This arrester may be used on signal circuits, fire alarm systems, remote metering circuits, etc.

Magnetic Switch.—A smaller and cheaper magnetic switch of the CR-7006 type with temperature overload relays has been designed by the General Electric Company. It bears the designation CR 7006-D-20. The switch requires a very small mounting space. Very large barriers are used, and this, the company asserts, permits the switch to interrupt extremely high currents. The electrical interlock is so designed that by removing a wire from the back of the base it is possible to use the switch on insulated circuits.

High-Low Water Alarm Signal Panel.—A signal panel, the CR-4779-A-1, has been designed by the General Electric Company for use in pump installations, especially in buildings, as a warning signal for the purpose of calling an attendant in case of danger from overflow or emptying of the tank. The panel is governed by one or two float switches. With this panel an audible signal sounds immediately when either the predetermined high or the predetermined low level of water is reached. "High" and "low" signal lamps are provided. The panel can be used for a one-level signal by omitting the float switch for the other level. It can also be used on pressure systems, but when single-pole float or pressure switches are used it is necessary to add a relay in place of the other pole.

New Trade Literature

RAILWAY INSTRUMENTS. — Bulletin No. 4,000 issued by the Weston Electrical Instrument Corporation, Newark, N. J., describes the Weston railway instruments for use in the various branches of electrical service on steam railways, including signal communication, car equipment, motive power, electrical and power departments. The various instruments are classified by departments, and each instrument is illustrated and described.

AIR FILTERS.—The Midwest Air Filters, Inc., Bradford, Pa., is distributing a folder covering the Midwest horizontal automatic self-cleaning air filter. It contains blueprints showing two views of the horizontal method of installation.

ELECTRIC RANGES, HOT PLATES AND WATER HEATERS. — Catalog G6 issued by the Edison Electric Appliance Company, Inc., 5600 West Taylor Street, Chicago, describes its "Hotpoint" electric ranges, hotplates, water heaters, air heaters, economy cookers, etc. Complete specifications and illustrations of each unit are included.

BACKFILLERS. — The Harnischfeger Corporation, Milwaukee, is distributing bulletin BF 1, describing its new "P. & H." backfiller, model 35. Attention is also called to the "P. & H." trenching machinery.

TABLE FAN AND SOCKETS.—Harvey Hubbell, Inc., Bridgeport, Conn., is distributing three leaflets for insertion in the firm's general catalog. The leaflets cover the Hubbell table fan, canopy pull sockets and porcelain mogul sockets.

FLUE-GAS ANALYSIS. — The Republic Flow Meters Company, 2240 Diversey Parkway, Chicago, has issued bulletin CO-34, entitled "Flue Gas Analysis with Republic CO_2 Recorders," in which it shows results obtained by the use of Republic CO_2 recorders in various plants. Charts showing a record of observation in a boiler room and a chart which gives the readings in dollars are included.

FLEXIBLE SHAFTS.—The Stow Manufacturing Company, Binghamton, N. Y., is distributing a bulletin covering the Stow flexible shafts for mechanical operation and distant control. Engineering and mechanical data on Stow flexible shafts are also included.

DISTRIBUTION TRANSFORMERS. — Circular 1688-B issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., describes its various types of distribution and small power transformers. Two pages are devoted to charts showing the application of various kinds of transformers, depending upon the rating and the voltage classification.

CREOSOTED TIMBERS. — A booklet issued by the Taylor-Colquitt Company, Spartanburg, S. C., describes its creosoted timbers, cross-ties, poles, etc., for all structural purposes. The booklet discusses the reasons for using treated timber and contains a very complete illustrated description of the company's plant and equipment. The A. T. & T. and N. E. L. A. creosote yellow-pine pole specifications are included.

INDUCTION MOTORS.—Bulletin GEA-6 issued by the General Electric Company, Schenectady, N. Y., covers the "G-E" squirrel-cage induction motors, "500 Series," from 15 hp. to 150 hp.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Purchase is desired in Stuttgart, Germany (Nos. 25,850 and 25,909), of electrical household appliances.

Purchase and agency are desired in Amersfoort, Netherlands (No. 25,858), for electrical household appliances.

Purchase and agency are desired in Berlin, Germany (No. 25,873), for electrical instruments and tools.

Purchase is desired in Johannesburg, South Africa (No. 25,961), of dry batteries and power plant machinery.

Purchase is desired in Guelph, Canada (No. 26,009), of electric household appliances, especially washing-machine parts.

An agency is desired in Riga, Latvia (No. 26,011), for electric household appliances, radio sets and parts.

An agency is desired in Copenhagen, Denmark (No. 26,010), for household refrigerators, commercial lighting fixtures, radio sets and parts.

Purchase and agency are desired in Lisbon, Portugal (No. 25,959), for electric motors.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

CHICOPEE, MASS. — Plans are under consideration by the Municipal Electric Light Department for placing all transmission wires underground. Estimates at present are being made to place wires on Front and Springfield Streets underground.

SPRINGFIELD, MASS. — The United Electric Light Company plans to install an underground conduit system on Columbus Avenue, from Bridge to Sargeant Street.

Middle Atlantic States

BUFFALO, N. Y.—The New York Central Railroad Company, New York, plans to build a power plant on local site, to be used in connection with terminal operations, to cost about $100,000.

GENEVA, N. Y.—Permission has been granted the Empire Gas & Electric Company to extend its transmission lines in the towns of Tyre and Montezuma. The proposed extension will be made from the town of Throop. Street-lighting service will be furnished in Montezuma.

NEW YORK, N. Y.—An expenditure of an additional $14,944,475 has been authorized by the directors of the New York Telephone Company for new construction work in the territory it serves.

JERSEY CITY, N. J.—Plans have been filed by the Public Service Electric & Gas Company, Newark, for a switching station at its generating plant on the Hackensack River, to cost about $95,000. Plans have also been prepared for a storage and distributing building at the same station, to cost about $75,000.

PATERSON, N. J. — Plans have been prepared by the Public Service Electric & Gas Company, Newark, for a substation on River Street, to cost about $100,000.

ALLENTOWN, PA.—Plans for the proposed local mill of the Arcadia Knitting Mills, Inc., 473 Kent Avenue, Brooklyn, N. Y., to be erected at South Eighth Street and the Mack Road, at a cost of $100,000, include a power plant.

WASHINGTON BARRACKS, D. C.—Bids will be received by the Quartermaster, Washington Barracks, until June 22, for fuel-saving equipment (Circular 31).

North Central States

COLUMBUS, OHIO.—Preliminary plans are being prepared by the Columbus Railway, Power & Light Company for a substation to be erected on Tremont Avenue to supply service for the River Ridge and other subdivisions.

KENT, OHIO.—Bids will be received by W. Acluff, secretary of board of trustees of Kent Normal School, for construction of 300-ft. tunnel, revamping steam pipes and electric system, at a cost of about $75,000. Ronan & Ingleson, 1614½ North High Street, Columbus, are engineers.

MURRAY, KY.—The Kentucky-Tennessee Light & Power Company, Bowling Green, plans to build a transmission line to this district, for service at Murray, Puryear and vicinity.

INDIANAPOLIS, IND. — The Interstate Public Service Company has applied to the Federal Power Commission for a preliminary permit covering a power project on the East Fork of the White River at Haysville. A dam 22 ft. high will develop 1,300 hp. of primary power. It is proposed to install 5,000 hp. The company has also applied for a preliminary permit covering a site at Shoals in the same stream, where it proposes to develop 8,000 hp.

PEORIA, ILL.—The installation of an ornamental lighting system on portions of East McClure and West Bell Avenues, to cost about $25,000, is under consideration. W. E. Backus is city engineer.

PHILADELPHIA, ILL. — The Central Illinois Public Service Company, Springfield, has petitioned for authority to erect a 6,600-volt line and distribution system in Philadelphia, and to maintain a transmission line of 33,000 volts in this vicinty.

ROSCOE, ILL. — Extensions and improvements are contemplated by the Roscoe Electric Company to its system, involving an expenditure of about $50,000. Authority has been granted the company to erect a transmission line and distribution system in Harlem and Guilford Townships, to cost about $20,000. The company has also applied for permission to erect a transmission line to Shirland and community, to cost about $30,000.

PLATTEVILLE, WIS. — The Interstate Light & Power Company, Galena, is planning extensions and improvements in transmission lines in this section, including rebuilding a portion of the distribution system in the southern part of the city.

WINONA, MINN.—Plans are under way by the Mississippi Valley Public Service Company for extensions and improvements in its power plant, to cost about $30,000. Mead & Seastone, Madison, are engineers.

WESTFIELD, IOWA.—The installation of an ornamental lighting system on Main Street, in the downtown district is under consideration.

CAPE GIRARDEAU, MO.—Preliminary plans are being prepared by the Missouri Utilities Company, for waterworks, pumping, filtration plant, etc., at Cape Rock, to cost about $176,500.

MACON, MO.—Plans under way for extensions and improvements in the municipal electric plant and waterworks, including the installation of additional equipment, to cost about $165,000. Burns & McDonnell, Interstate Building, Kansas City, are engineers.

MARSHFIELD, MO.—Authority has been granted the Missouri Electric Power Company to erect an electric transmission line from a point 1 mile north of Seymour to Rogersville, through Fordland. The line will be erected for 33,000 volts, but will carry only 6,600 volts for the present.

POPLAR BLUFF, MO.—Bids will be received by the Black River Hydro-Electric Company, Poplar Bluff, until June 24 for the construction of an earth fill dam with concrete core wall, concrete flume and concrete spillway. W. A. Fuller, 1917 Railway Exchange Building, St. Louis, is engineer in charge.

ST. LOUIS, MO.—Bids will be received by the Board of Public Service, Room 208, City Hall, until June 28 for installing a complete electric lighting system in District "E."

WASHBURN, N. D.—The State Railroad Commissioners has approved the route and plans for erection of a transmission line from Washburn to Brinsmade by the Otter Tail Power Company, Fergus Falls, Minn.

RANDOLPH, NEB. — Plans have been approved by the City Council for extensions to the municipal power plant, including the installation of additional equipment.

WILBER, NEB.—The Council is considering calling an election to vote on the proposal to issue $35,000 in bonds for improvements to the municipal electric light and water works plant.

Southern States

DENTON, N. C.—The Southern Power Company, Charlotte, plans to extend its transmission line from Denton to High Point to furnish service there.

RANDLEMAN, N. C.—The North Carolina Public Service Company, Greensboro, plans to build a transmission line and a substation for local service.

SALUDA, S. C.—A franchise has been granted the Broad River Power Company, Columbia, to extend its transmission lines in this section for local service.

PENDLETON, S. C.—The Southern Public Utilities Company, Charlotte, which has acquired the plant of the Pendleton Electric Company, plans extensions and improvements in this section, including the erection of transmission lines.

ST. MATTHEWS, S. C. — The Broad River Power Company, Columbia, which has acquired the municipal electric plant, plans to build a transmission line to this vicinity for light and power service, connecting with its generating plant at Parr Shoals.

ATLANTA, GA. — The Georgia Power Company plans to erect a 38,000-volt transmission line from Powder Springs through Hiram to Dallas, a distance of 13 miles. Franchises have been granted the company to distribute electricity in Hiram and Dallas. A 2,300-volt, three-phase distribution system will be built in Hiram.

MT. ZION, GA. — The Georgia Power Company will construct a 2,300-volt, three-phase distribution system in Mt. Zion. Power for the local system will be obtained from the transmission being erected from Bremen to Bowden.

JACKSONVILLE, FLA. — Bids will be received by the City Commission until June 27, for extensions to and changes in the municipal electric plant on Talleyrand Avenue, including extensions and changes in building, structural steel work, steel windows and operating gear. The Scofield Engineering Company, Philadelphia, are consulting engineers.

MIAMI, FLA. — The Florida Power & Light Company plans extensions and improvements in its underground conduit system in N. W. Third Avenue, and the erection of a power line from the Coconut Grove substation to the vicinity of Bird Road. Also extensions and improvements in the street-lighting systems at Hialeah, Seaboard Park, and Miami Beach.

TAMPA, FLA. — Plans are being prepared by the City Council is for the installation of an ornamental lighting system on Platt Street, between Franklin and Howard Avenue.

WINTER PARK, FLA. — The Florida Public Service Company plans extensions and improvements in its plant and system in this vicinity.

BIRMINGHAM, ALA. — The Alabama Power Company has applied to the Public Service Commission, for permission to erect a transmission line from Haleville to Bear Creek and from Campbell to Spruce Pine.

EUROPA, MISS.—Plans are being prepared by the Inland Utilities Company, 1310 Liberty Street, Kansas City, Mo., for the construction of a steam-driven electric plant in this vicinity, with transmission line to Stewart, Maben, Calhoun City and vicinity. The cost of the entire project is estimated at $200,000.

PICAYUNE, MISS. — Plans are under way by the City Council for the installation of an ornamental lighting system in the downtown district. Harry A. Mentz, Hammond, La., is consulting engineer.

WHITE CLIFFS, ARK.—Plans for the proposed local cement mill to be erected by the Lime Products Company, Little Rock, to cost about $1,300,000, include a power plant. The Lund Engineering Company, Home Insurance Building, Little Rock, is engineer.

DENHAM SPRINGS, LA.—A franchise has been granted the Louisiana Ice & Utilities Company, Alexandria, to erect a transmission line in this vicinity for light and power service.

NEW ORLEANS, LA.—The installation of forty-eight 1,000-watt arc lamps, on Dryades Street, has been announced by William T. Hall, commissioner of Public Utilities.

SHREVEPORT, LA.—The Southwestern Gas & Electric Company plans to erect several substations in different parts of the city, to cost about $90,000.

BOISE CITY, OKLA.—Plans are being prepared by the Cimarroon Utilities Company, a subsidiary of the Kansas City (Mo.) Power Securities Corporation, for the installation of a 10-ton ice plant. The equipment will include two oil engine driven generators and switchboard.

OKLAHOMA CITY, OKLA.—The following transmission line construction is now under way or planned for the immediate future by the Southwestern Light & Power Company. A 66,000-volt line from Lawton to Chickasha, 45 miles long; a 13,000-volt line from Gracemont to Hinton, 28 miles; 66,000-volt line from Chickasha, 61 miles; 33,000-volt line from Clinton to Bessie, 11 miles; 33,000-volt line from Sayre Junction to Sayre, 9 miles; 13,000-volt line from Altus to Martha, 7 miles. New electric distributions systems in Martha, Binger and Lookeba. A new 4,500-kw., 66,000-volt substation at the Chickasha hydro-electric plant, and a 2,000-kw., 13,000-volt substation at the Chickasha steam plant, etc.

ATHENS, TEX.—The Texas Power & Light Company, Dallas, which has acquired the system of the Athens Light & Power Company, plans extensions in its transmission lines in this section.

HOUSTON, TEX.—The Houston Lighting & Power Company plans to erect a transmission line to West Columbia where power will be furnished to the Humble Oil Company.

Pacific and Mountain States

ABERDEEN, WASH.—The Grays Harbor Railway & Light Company contemplates extensions and improvements in its local power plant, including the installation of additional equipment, to cost about $1,000,000.

BELLINGHAM, WASH. — Steps have been taken by the Chamber of Commerce for the installation of a new street lighting system in the business district, to include 270 standards. The cost is estimated at $70,000.

EUGENE, ORE.—At a special election to be held June 28 the proposal to issue $1,250,000 in bonds will be submitted to the voters. The proceeds will be used for expansion in the municipal hydro-electric plant, increasing the output by 18,000 hp. and also the erection of a 30-mile transmission line. The total cost is estimated at $2,000,000. J. W. McArthur is chief engineer.

BURLINGAME, CAL. — Bonds to the amount of $85,000 have been voted for a fire-alarm system.

CULVER CITY, CAL.—The installation of an ornamental lighting system on portions of Culver Boulevard, Washington Street and Overland Avenue, to cost about $25,000, is under consideration.

FRESNO, CAL.—Estimates of cost are being prepared by the City Engineering Department for the installation of improved street lamps on a number of thoroughfares. Extensions and improvements are also planned in the fire-alarm system.

HERALDSBURG, CAL.—The City Council has authorized the installation of an ornamental lighting system with underground conduits on a portion of Johnson Street.

LOS ANGELES, CAL.—The City Council has authorized the installation of ornamental lamps on a portion of Broadway, using pressed steel standards, and on Central Avenue, using concrete standards.

LOS ANGELES, CAL.—The City Council has authorized plans for the installation of ornamental lamps on portions of Francis Avenue, using pressed steel standards, on Montana Avenue, and on Redondo Boulevard, using concrete standards.

RIVERSIDE, CAL.—The City Council is considering the installation of an ornamental lighting system on South Brockton Avenue and on Stewart Drive.

SALT LAKE CITY, UTAH. — Contract has been awarded to the Utah Power & Light Company for the installation of an ornamental lighting system on Second Street, South, to cost about $60,000.

GRASS CREEK, WYO.—Plans have been prepared by Arthur K. Lee, Thermopolis, and associates for the erection of a transmission line from the Shoshone Dam, near Cody, to the Hamilton Dome Oilfield and Grass Creek, to cost about $100,000.

BEULAH, COL.—Plans are being prepared by the City Council of Pueblo, for the construction of an electric lighting station for service in the City Mountain Parks. D. P. Gaymon is engineer.

DENVER, COL.—The City Council has authorized the Colorado Public Service Company to install forty additional street lamps.

Canada

PORT HAWKESBURY, N. S.—Plans have been approved by the City Council for the construction of a municipal electric plant, to cost about $21,000. E. C. Embree is engineer.

FORT WILLIAM, ONT. — Plans are under way by the Hydro-Electric Power Commission of Ontario (Thunder Bay System), for developing an additional 100,000 hp. at Virgin Falls and Portage Island.

WINNIPEG, MAN.—The Manitoba Government has authorized an expenditure of $3,000,000 for extensions to the provincial hydro-electric system, to be made during the next four years.

WINNIPEG, MAN.—The Winnipeg Hydro Electric Commission has authorized a fund of $700,000 for additional substations and transmission lines.

Electrical Patents

Announced by U. S. Patent Office

(Issued May 24, 1927)

1,630,224. ELECTROLYTIC METHOD AND APPARATUS; K. E. Stuart, Niagara Falls, N. Y. App. filed March 5, 1925.

1,630,237. ELECTRIC COOKER; J. E. Smith, East Orange, N. J. App. filed Oct. 22, 1926. Using a heating agent consisting of ordinary electric light bulbs placed on opposite sides of the utensil that contains or supports the substance or article that is to be cooked.

(Issued May 31, 1927)

1,630,272. ELECTRIC CONNECTING SOCKET; F. W. Neuner, Connersville, Ind. App. filed Feb. 26, 1923. As used in miniature-lamp circuits.

1,630,358. CUT-OUT; M. J. Sandin, Wilkinsburg, Pa. App. filed April 1, 1922. May be mounted in standard fuse clips or jaws and substituted for standard fuses.

1,630,359. ELECTRIC SWITCH; G. F. Scott, Wilkinsburg, Pa. App. filed Dec. 7, 1920. Push-button control switch in normally open or normally closed types.

1,630,363. TRANSFORMER - TAP - CHANGING DEVICE; H. A. Travers, Forest Hills, Pa. App. filed June 16, 1926. A protective system for transformer and tap-changing apparatus that shall protect the apparatus from conditions of short circuit within the transformer winding.

1,630,368. RESISTOR MOUNTING FOR ELECTRIC FURNACES; J. C. Woodson, East Pittsburgh, Pa. App. filed April 8, 1924.

1,630,372. ELECTRIC SWITCH; W. A. Coates, Chorlton-cum-Hardy, England, and G. E. Gittins and D. R. Davies, Stretford, Manchester, England. App. filed June 5, 1922. Means for operating a plurality of associated switches in a predetermined relation, as where selector switches are used with two sets of busbars.

1,630,389. SWITCH MECHANISM; O. S. Jennings, Edgewood Park, Pa. App. filed Aug. 18, 1921. Inclosed safety type.

1,630,390. ALTERNATING-CURRENT MOTOR; K. Krauss, Berlin-Friednau, Germany. App. filed May 28, 1925. Series motors employing a commutating-pole winding.

1,630,394. SPEED GOVERNOR FOR ELECTRIC MOTORS; R. Lee, Milwaukee, Wis. App. filed Sept. 26, 1923. Speed controller of the automatic breaker type.

1,630,401. CONNECTOR; H. R. Meyer, Wilkinsburg, Pa. App. filed May 17, 1920. Of the type used in connecting electric current conductors which carry control, lighting, heating and motor currents between cars of a train.

1,630,433. PUSH-THROUGH SWITCH; W. Ile, Jackson, Mich. App. filed Aug. 18, 1925.

1,630,434. ELECTRIC SWITCH; G. Mann, Jackson, Mich. App. filed Nov. 30, 1925. Of the push-button type.

1,630,435. ELECTRIC MASSAGE MACHINE; B. F. Jancke, New York, N. Y. App. filed May 18, 1925.

1,630,455. CIRCUIT CLOSER FOR HOLD-UP ALARMS; C. Weber, Hilton, Neb. App. filed May 27, 1926.

1,630,460. CONTACT BRUSH AND METHOD OF MAKING SAME; W. M. Austin, Swissvale, Pa. App. filed Oct. 28, 1922. Laminated copper brush as used in circuit breakers.

1,630,477. CIRCUIT INTERRUPTER; O. H. Eschholz, Wilkinsburg, Pa. App. filed July 5, 1922. With arcing tips and magnetic blow-out.

1,630,491. SHORT-CIRCUITING DEVICE; W. J. Krause, Cleveland, Ohio. App. filed June 13, 1924. For repulsion induction motors.

1,630,503. ARMATURE FOR DISTANT-CONTROL INDICATORS FOR CONTINUOUS AND ALTERNATING CURRENT; H. Usener, Kiel, Germany. App. filed April 28, 1923.

1,630,586. THERMOSTAT SWITCH; I. E. Smith, Stockton, Cal. App. filed May 8, 1925. Expansible fluid type.

1,630,649. ELECTRIC HEATER; H. Z. Ziola, Toledo, Ohio. App. filed July 21, 1924. Having a heating unit wherein the resistance wire is arranged wholly upon the outside of the unit, no portion thereof running through the center of the core.

1,630,650. ELECTROMAGNETIC SWITCH; D. M. Bliss, Syracuse, N. Y. App. filed March 11, 1924. Latch-trip type adapted to be used more particularly in connection with clothes washing and wringing mechanisms when combined in the same machine and operated by an electric motor.

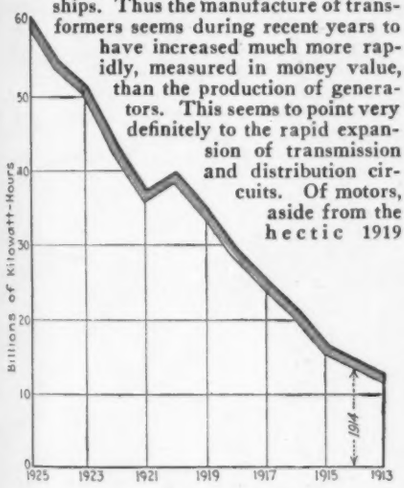
Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

Electrical Manufacturing Industry's Prosperity Interlinked with Power Companies' Progress

ANALYSIS of the recently published results of the Census of Manufactures for 1925 shows that the money value of electrical products in that year was nearly five times as great as in the year 1914, being about $1,540,000,000, against $335,000,000. Meanwhile the output of electrical energy rose from 14,400,000,000 kw.-hr. to 61,000,000,000 kw.-hr., roughly a fourfold increase.

Study of a few groups of particular interest to the light and power industry reveals certain very definite trends and relationships. Thus the manufacture of transformers seems during recent years to have increased much more rapidly, measured in money value, than the production of generators. This seems to point very definitely to the rapid expansion of transmission and distribution circuits. Of motors, aside from the hectic 1919 period, the production is constantly increasing.



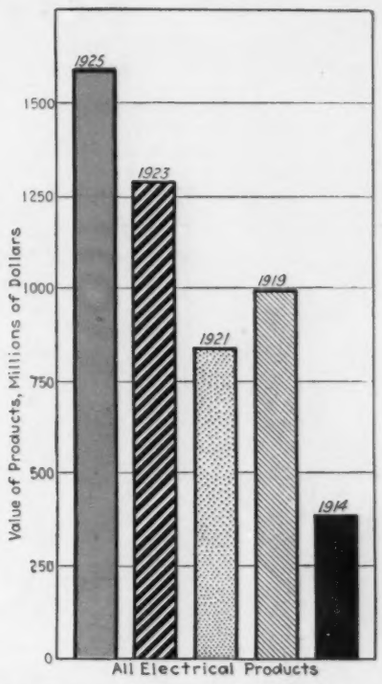
Central-Station Energy Output

The building boom is reflected in the growing sales of wiring devices and conduits, the electrification of the home in the twenty-fold increase (since 1914) in household, heating and cooking appliances. The annual increase in the latter group, from about $67,000,000 worth in 1923 to $74,700,000 worth in 1925, was equal to the total output in 1914.

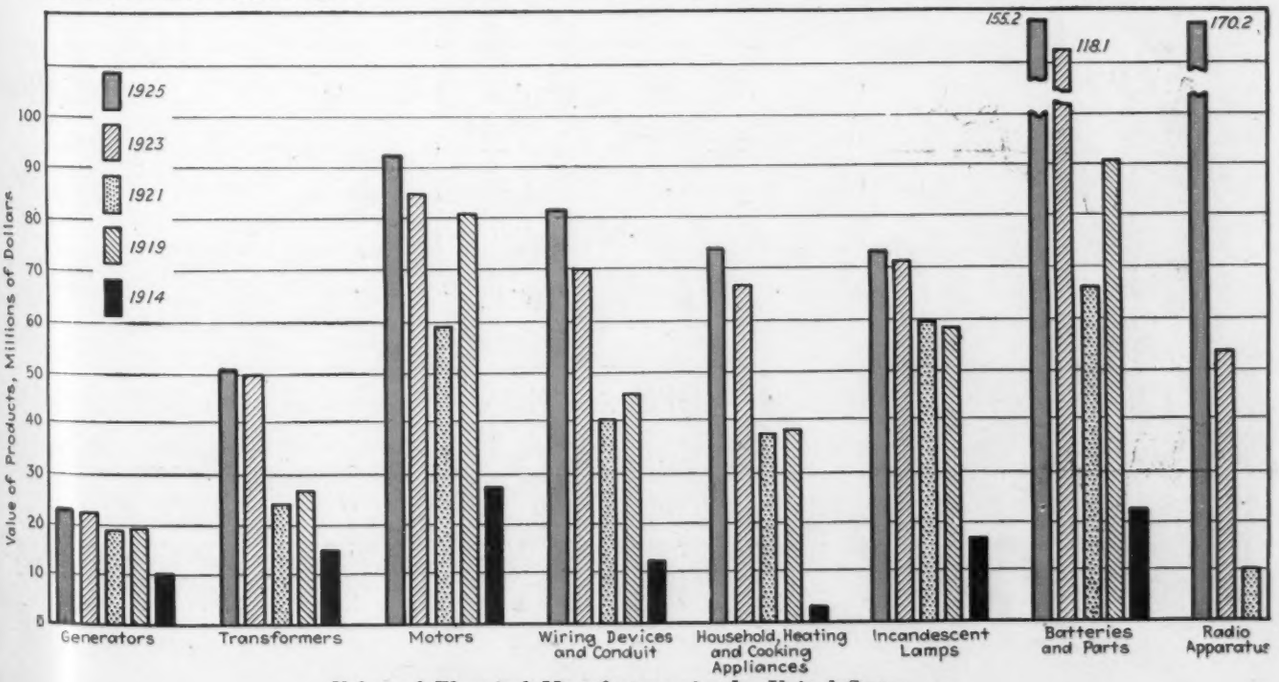
With reference to illumination the erroneous inference might be drawn that little progress was made from 1923 to 1925. The truth is that the number of ordinary tungsten lamps produced in 1925 exceeded the number in 1923 by about 15 per cent, but the increase in value was only 1.3 per cent. This does not take into account the increase in the average size. On a money basis, the increase in production of incandescent lamps since 1914 was more than fourfold; in terms of candlepower or lumens it must be far greater.

The chart shows that every dollar put into generating equipment has as companions $2 for transformers, more than $4 for motors, nearly $4 for wiring devices and conduit, $3.50 for household appliances and another $2.50 for incandescent lamps, exclusive of automobile and miniature lamps. In addition, there is the increased consumption of wire and other materials not charted.

The last two groups, batteries and radio apparatus, in their rapid growth reflect both the growing use of the automobile and the popularity of ether-transmitted entertainment. Evidence of the expanding total of electrical equipment in use is found in the fourfold increase of energy output from 1914 to 1925.



Total Value of Electrical Manufactures



Value of Electrical Manufactures in the United States

New England Production Above Last Year

A SEASONAL recession in manufacturing production similar to that witnessed last year was recorded by the manufacturing plants of the New England States during April and May. Actual production, however, has been on a higher plane than during the year previous ever since the summer of 1926. This high rate of productivity has been due mainly to the record activities which have been reported by the textile mills of the section, although several other primary industries have also been reporting high production during this period. Such is the condition of New England industry as indicated by the monthly consumption of electrical energy by about 400 large manufacturing plants scattered throughout the section and in various industries.

May productive activity in the New England manufacturing plants taken as a whole was 3.2 per cent under that of April, but was 7.7 per cent above May of last year. This increase over 1926 is very close to the increase recorded during May by the nation's industries as a whole, 6.8 per cent. There is no doubt that a portion of these increases in industrial activity are due to the normal increase in population in the nation and the section, but what proportion can be attributed to this condition and what proportion to general business conditions is questionable. What is certain is that these reports of energy production indicate a substantial gain over production of last year.

The textile industry reported its peak of productivity in May, production during that month being at a higher rate than during any time since June, 1923. During April the production declined, and May production was about the same as that of April. May activity in the textile mills, however, was about 11 per cent over May of last year. A comparison of the activities of the textile mills in the New England States and those in the Southern States indicates that during May textile plants in the Southern States were operating on a plane about 12 per cent above that of the New England textile plants.

The rubber goods manufacturing plants of the section were operating during May at about 4 per cent over last year, the May operations being slightly above those of April. The peak in the productivity of these plants was recorded in March, since which time the production has been declining in accordance with a well-established seasonal trend.

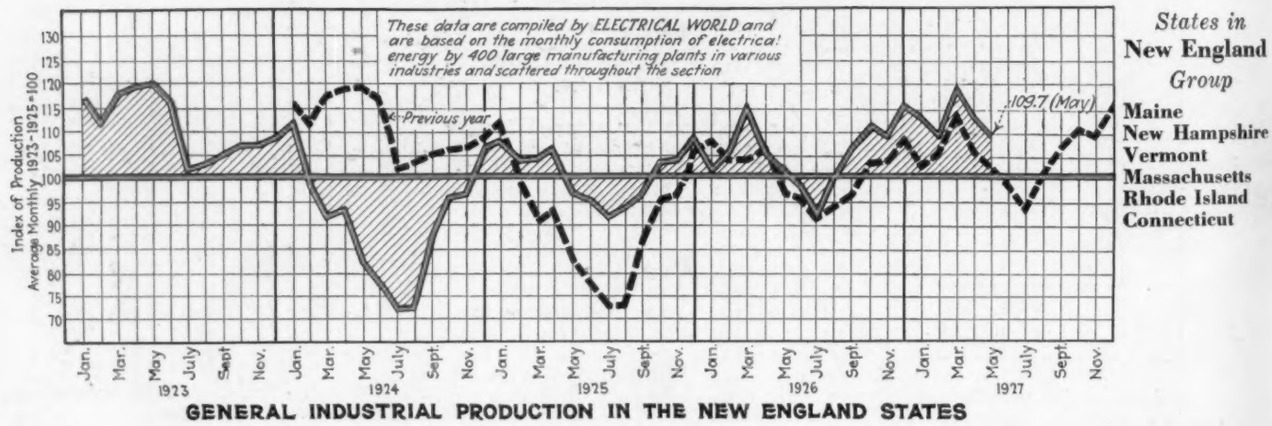
The leather and leather products industry, while apparently operating at a decreased rate as compared with years prior to 1924, yet is operating at a favorable rate as compared with last year, the May operations being about 7 per cent over May of last year.

Paper and pulp mills of the New England States also reported May production well above that of last year, though like most all of the other primary industries of the section seasonal influences were such as to result in a decreased energy demand during the month of May.

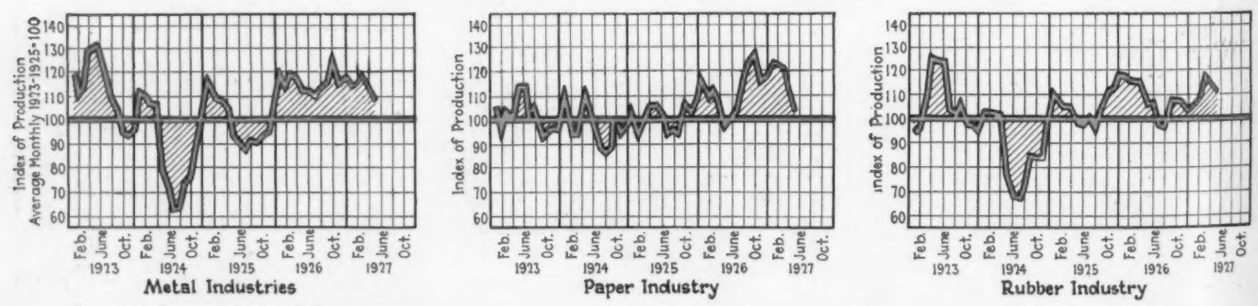
Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote for use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WORLD in obtaining and compiling further basic information if those who make use of these statistics would give credit to the ELECTRICAL WORLD.

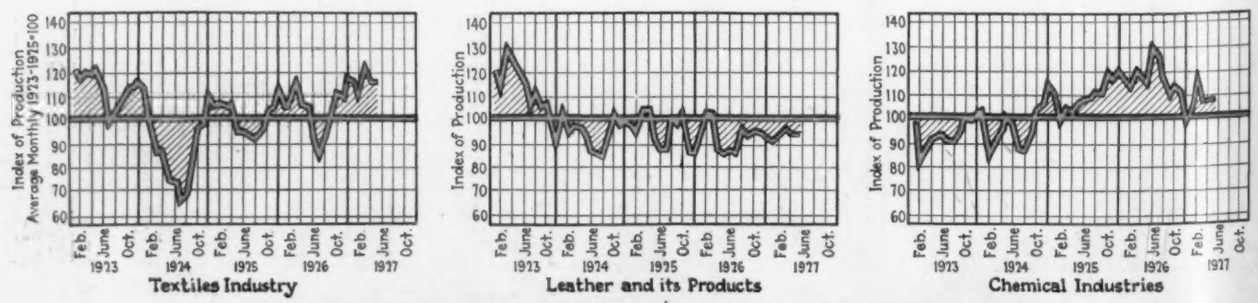
"Electrical World" Barometer of Industrial Activity in the New England States

(Data Unadjusted for Seasonal Variation)



GENERAL INDUSTRIAL PRODUCTION IN THE NEW ENGLAND STATES





ACTIVITY IN THE PRIMARY INDUSTRIES OF THE NEW ENGLAND STATES